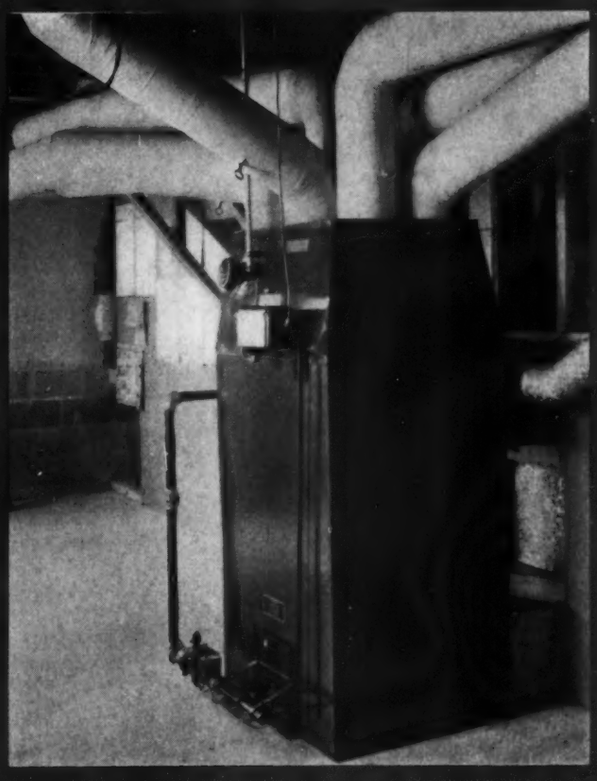
AMERICAN ARTISAN

CTOBER
1940



RESIDENTIAL AIR CONDITIONING
WARM AIR HEATING • SHEET METAL CONTRACTING

ESTABLISHED
1880

Is YOUR SHOP Overloaded?

LAMNECK Series 700 System

PREFABRICATED DUCT AND FITTINGS

LAMNECK'S Duct Assembly Eliminates the Bottleneck!

Shipped knocked down and nested. Duct sections include connector. Assembled in 30 seconds.

No seams at edges. All seams or double metal are in the "flat." Both width or length cut easily.

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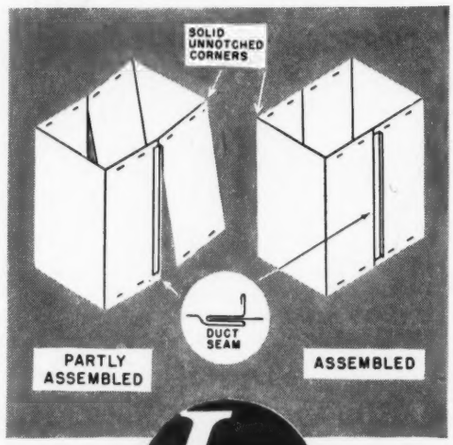
These are a few of the many labor-saving advantages to your using Lamneck's Revolutionary Prefabricated Duct and Fittings. Write now for complete details.

Distributors Have Ample Stocks to Instantly Supply Your Needs!

You SAVE 5 Ways!

This is easy to understand when you stop to consider how LAMNECK Prefabricated Duct and Fittings are made. First of all, they are planned by engineers—planned not only to eliminate your scrap pile, but most important of all to reduce your assembly and installation cost. This duct insures still further economies in material cost, because predetermined engineering includes correct design, permitting maximum air flow with minimum sizes of ductwork. The result is a total reduction of the cost of your ductwork *installed* of from 25 to 50 percent, as compared with old fashioned shop practice. And you get every penny of this saving.



Specify LAMNECK

After you write for the name of your nearby distributor, sit down and talk with him. You can rely on his sound advice and judgment.

LP INC

Prefabricated Duct and Fittings for all Types of Residential Warm Air Heating and Air Conditioning Systems.

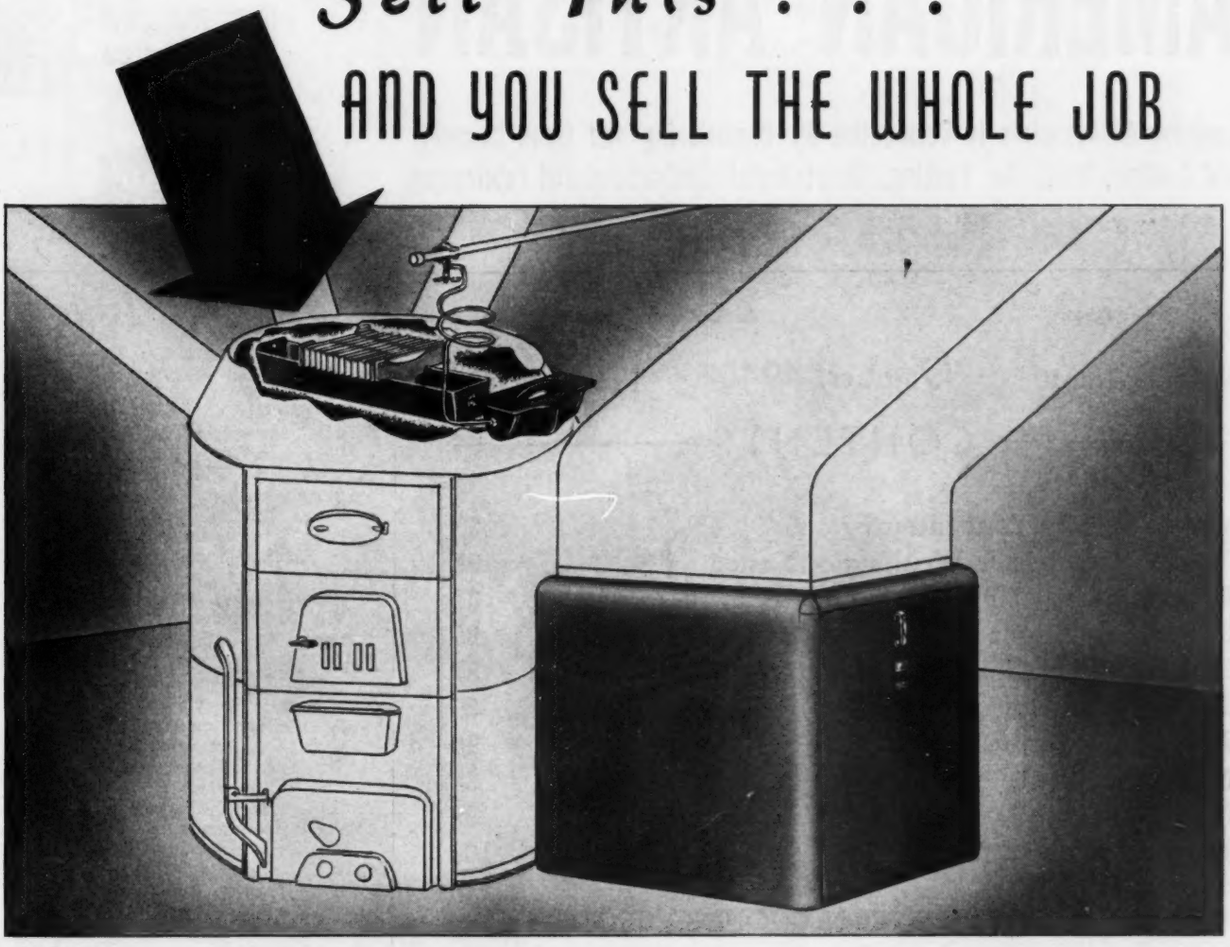
NOTE OUR NEW ADDRESS

LAMNECK PRODUCTS, INC.

Middletown, Ohio

Sell This . . .

AND YOU SELL THE WHOLE JOB



AN EASY WAY TO BUILD SALES

Your customers are humidity-conscious. They'll be glad to listen while you point out this Viking Humidifier's features—its fool-proof top-seat valve, its newly developed "Cello-Sponge" evaporators, its high capacity and other sales-making details of design and appearance.

Humidification is the most inexpensive part of winter air conditioning, yet it paves the way for you to sell Viking Conditioners, because the purchase of humidification naturally leads to the desire for clean, forced warm air.

Viking Humidifiers and Conditioners are noteworthy for their advanced engineering and have demonstrated their superiority in service. They are loaded with sales features. Display them for quick sales.

Let us tell you more about them and how they sell— *write today.*

FANS.....
BLOWERS...
HUMIDIFIERS

Viking Air Conditioning Corp.
9490 Richmond Avenue, S. E. Cleveland, Ohio

VIKING AIR CONDITIONING CORPORATION

AMERICAN ARTISAN

WITH WHICH ARE MERGED

FURNACES and SHEET METALS

AND

Warm-Air Heating

Covering All Activities in Residential Air Conditioning and Small Commercial Cooling, Warm Air Heating, Sheet Metal Contracting and Fabricating

J. D. Wilder, Editor — A. A. Kennedy, Assistant Editor

Vol. 109, No. 10 — October, 1940 — Founded 1880

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In This Issue

WE call attention to this month's cover photo. In gathering material for the July Low Cost House Survey, several houses heated by George Adema, Buffalo, N. Y., were inspected. This is a gas-fired, gravity furnace in a low cost house having three floor levels. High side wall registers are used in first floor rooms (½-story above the basement) and baseboard registers on 1½ and second floors. We thought the installation pretty neat.

•

Three reports in this issue are worthy of every reader's attention. The editorial on page 37 briefs a plan for action; the Kruckman Washington Letter (page 38) which lists all rearmament contracts to date; the National Warm Air Ass'n's recommendations for standard furnace products (page 85).

This industry, to date, has the edge in rearmament heating, but we won't hold this margin long if competition is permitted to "submarine" our contracts. The potential business is worth fighting for. Let's all help!

•

Contractors looking for a simplified method of engineering forced air heating systems may like W. W. Howe's idea beginning on page 41. We have checked his methods against Technical Code and accepted formulas and find his figures do not vary enough to worry about. Of course, this method has some limitations as to building size, building layout, outside temperature, but his "steps" can be corrected for conditions in your part of the country.

•

Three articles in this month's Sheet Metal Section tell "how"—Carter Cole's Intersections for batten roofs (page 63); two church spires re-covered with copper beginning to lay half way up the spire (page 74); and the methods used to handle a 160,000-pound duct installation in Buffalo's worst winter (page 70).

Member of Audit Bureau of Circulations — Member Associated Business Papers, Inc.

Published monthly by Keeney Publishing Company, 6 North Michigan Ave., Chicago, Ill., U. S. A. Branch Offices—In New York, Room 1734, Grand Central Terminal Building, Murray Hill 9-8293; In Cleveland, 2128 Rossmoor Road, Cleveland Heights, Yellowstone 1540; In Los Angeles, J. H. Tinkham, 1406 S. Grand Ave., Richmond 6191.

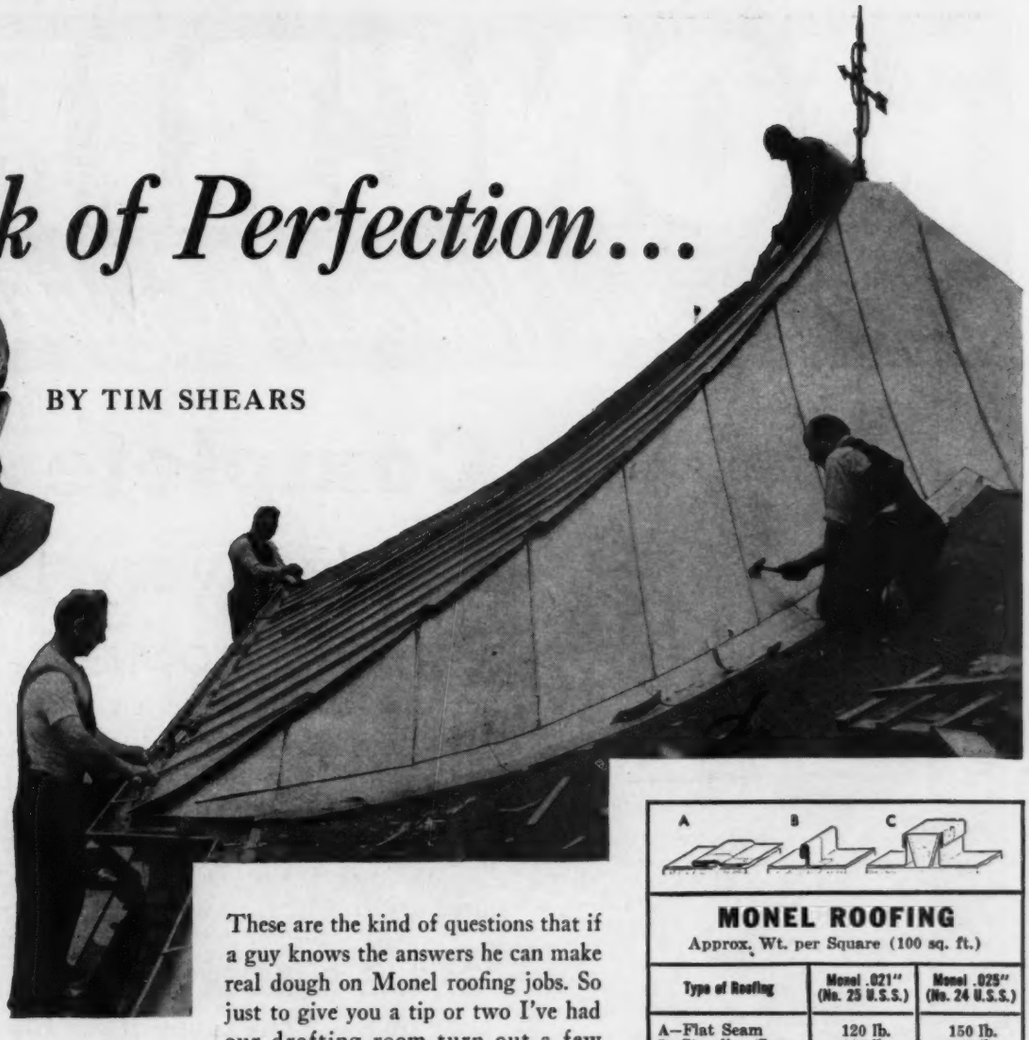
Copyright 1940 by Keeney Publishing Company—F. P. Keeney, President; W. J. Osborn, Vice President; R. Payne Wettstein, Secretary; Chas. E. Price, Treasurer. Advertising staff: Wallace J. Osborn, R. Payne Wettstein, Robert A. Jack, J. H. Tinkham, L. A. Doyle.

Yearly Subscription Price—U. S. and possessions, Canada, Mexico, South America, Central America, $2.00; Foreign, $4.00. Single copies, U. S. and possessions, $.25. Back numbers, $.50. January, 1940, Directory issue, $1.00 per copy. Entered as second-class matter, July 29, 1932, at the post office at Chicago, Illinois, under the act of March 3, 1879.

More than 8,000 copies of this issue are being distributed

Peak of Perfection...

BY TIM SHEARS



SEEIN' MONEL is the metal that butters my bread, I'd be the last to say you could do as good a roofin' job with somethin' else! But no kiddin', when it comes to roofs, Monel is sure tops... easy to handle but hard to wear out!

Just the same, it *pays to know what you're doin'*, even with sheet that's as simple to work with as Monel. Cast your eye on the picture an' you'll see it isn't any slob that can turn out a job of roofing like that.

It's on one of the park buildings for the new East River Drive in New York City. On these city projects they don't stand for metal that might rust and wear out before the toll gates have started to click. Nothin' but the best! An' the same goes for *workmanship!*

So gettin' back to the point, suppose *you* got one of these jobs... how would you tackle it? What kind of joint would you use? How would you make sure of a solid job of soldering?

These are the kind of questions that if a guy knows the answers he can make real dough on Monel roofing jobs. So just to give you a tip or two I've had our drafting room turn out a few sketches of different kinds of joints. Too bad they can't draw a picture of how to do the soldering too! But here's somethin' that's maybe better yet!

Some of the boys at the office that know more about these things than I do have been collectin' the latest dope on joints an' etcetera, an' also on soldering, brazing, welding an' what have you. They've dug up so much new stuff that we had to overhaul the old bulletin T-2 an' put out an honest-to-Pete up-to-the-minute sheet on "Welding, Brazing, and Soft Soldering of Monel, Nickel and Inconel."

You can take it from me that this classic is full of the real McCoy! No guess work or kindergarten stuff! It tells you sure-fire ways to handle Monel an' other INCO metals that engineers and sheet metal men have worked out right on the job.

So if you want to hit the "peak of perfection" on roofing jobs, here's your chance to get the right kind of dope.

MONEL ROOFING

Approx. Wt. per Square (100 sq. ft.)

Type of Roofing	Monel .021" (No. 25 U.S.S.)	Monel .025" (No. 24 U.S.S.)
A—Flat Seam	120 lb.	150 lb.
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C—Batten Seam	*125 lb.	*156 lb.
Wt. per Sq. Ft. Monel Sheets	1 lb.	1.16 lb.

*Varies with size of sheet used and spacing of battens

This bulletin is FREE, an' to make it easy to get, I'm putting on a coupon which all you have to do is mail it back to your old friend,

TIM SHEARS

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street New York, N. Y.

O. K. TIM... I'LL CALL YOUR BLUFF!

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67 Wall Street, New York, N. Y.

Gentlemen: I'd like a copy of bulletin T-2, "Welding, Brazing and Soft Soldering of Monel, Nickel and Inconel."

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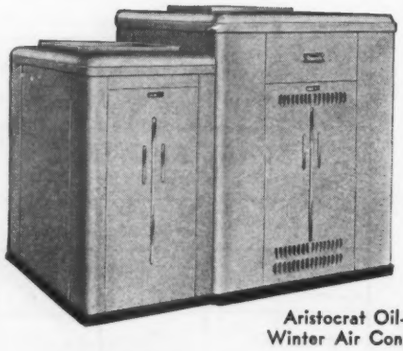
MONCRIEF

Furnaces and Winter Air Conditioners

Aristocrat Coal-Fired Winter Air Conditioner



Aristocrat Oil-Fired Winter Air Conditioner

Series "C" Cast Furnace—also supplied with square casing

Long Life Furnace Cast or Steel — also supplied with round casing

Complete Line

Meets Every Demand

OF THE HOME OWNER for a heating and air conditioning plant that will save fuel dollars and give long, trouble-free service.

OF THE ARCHITECT AND ENGINEER for correct design that produces high efficiency and styling in line with today's trends.

OF THE BUILDER for appearance and values that increase the salability of his houses.

AND MEETS YOUR DEMANDS for Quick Sales, Easy Installation, and Good Profits

Whatever the call, you can best meet it with a Moncrief, smartly styled, accurately constructed for quick, easy installing, and quality built throughout to give enduring satisfaction.

Get acquainted with the profit-making possibilities of the Moncrief Proposition. Write today for particulars.

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Moncrief Supplies Everything Used on a Warm Air Heating and Air Conditioning Job

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Compensating Adjustment Permits use of Any Convenient Location

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Responds Quickly to Temperature Changes
Simple Switch Linkage – No Friction Drives
Operates in Any Position

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Bi-metal Helix is Guarded
All Working Parts Protected

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MINNEAPOLIS-HONEYWELL

CONTROL *Systems*

DON'T OVERLOOK *the Hospital*

Big opportunities for sheet metal work in U·S·S Stainless Steel

IN THE BAKERY SHOP, *sinks and working surfaces of U·S·S Stainless Steel mean cleaner conditions. Worthwhile orders for the metal worker.*

SELDOM have opportunities for sheet metal work in hospitals been equal to what they are today. In every part of the country, new hospitals are going up, and older hospital structures are being modernized.

Have you considered what this means to you, in terms of sheet metal business? If not, it would pay you to talk to your local hospital authorities and find out where and how they are contemplating the use of stainless steel. Point out that you are equipped to handle their requirements. Make sure they appreciate the quality of your workmanship and the fact that you can supply equipment fabricated of the finest stainless steel money can buy—U·S·S Stainless.

Pictured here are a few examples of sheet metal work in U·S·S Stainless Steel, now in service in a famous southern hospital. You'll find other opportunities in clubs, hotels, restaurants, food markets, homes and factories. Wherever there's call for a long-lasting, easy-to-clean metal, use U·S·S Stainless Steel. Your profits will grow, and you'll have more satisfied customers. Write for data.

IN THE MAIN KITCHEN, *soup kettles and serving counters of U·S·S Stainless Steel. Profitable business for the fabricators.*

IN THE LABORATORY, *cabinets and tables of U·S·S Stainless Steel, the most serviceable metal obtainable, where sterile surfaces are needed.*

IN THE VEGETABLE WASHING ROOM, *sinks, working surfaces, pipe covers, and tubs of U·S·S Stainless Steel. Fabricated to fit available space.*

USS

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Scully Steel Products Company, Chicago, *Warehouse Distributors*

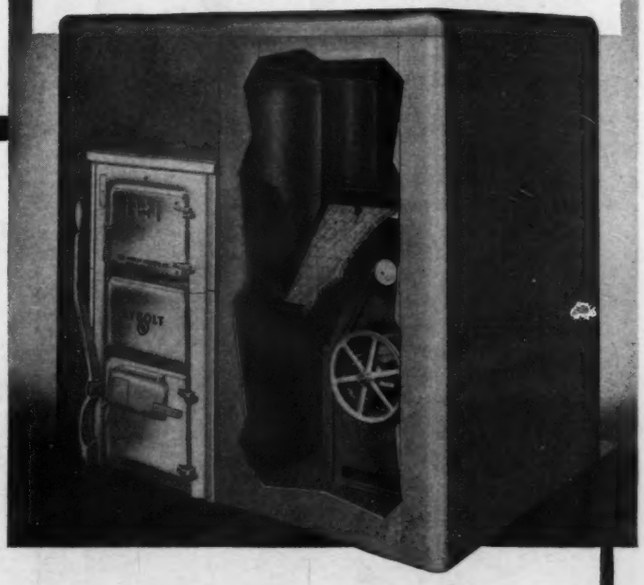
UNITED STATES STEEL

IT'S GOING TO BE A BIG SEASON FOR HEATING SALES—

get your share

with the complete RYBOLT LINE

RYBOLT STEEL COAL-FIRED WINTER AIR CONDITIONER • Series 4200



Heating sales this fall promise to top all records. You can get your share with the *complete RYBOLT line* because you can furnish anything the customer wants from a gravity furnace to a complete winter air conditioning unit —in steel or cast iron—fired by coal, gas, or oil.

One of the newest RYBOLT units—*a sure-fire sales getter*—is the Series 4200, RYBOLT Steel Coal-Fired Winter Air Conditioner. It has all the glamour and smart style that modern design can produce, yet is priced to be within the range of the average homeowner's budget. Has many advanced features which assure utmost comfort, convenience, efficiency, and economy. A special feature is the full height reversible blower cabinet which can be placed on either side of the unit. Compact and trim in design, the cabinet is attractively finished in lustrous gray Hammerloid enamel. 6 sizes. Has special chutes and cover plates to make it available for stoker firing.

The Gravity Furnace, Series 4000, in the round casing, is finished in galvanized; the square casing in either gray Hammerloid or galvanized.

RYBOLT OIL BURNER

The RYBOLT Oil Burner is completely automatic, safe and inexpensive to operate. Can be easily installed in any type furnace to modernize it. The RYBOLT Oil Burning Winter Air Conditioner is furnished complete with burner or sold without burner for use with any type oil burner. Smooth gray Hammerloid finish. 5 sizes.

WRITE FOR *set of folders covering the complete RYBOLT Line of Warm Air Furnaces and Winter Air Conditioners.*

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NO RIVETS - - NO WELDS - - FOUR-PIECE CONSTRUCTION

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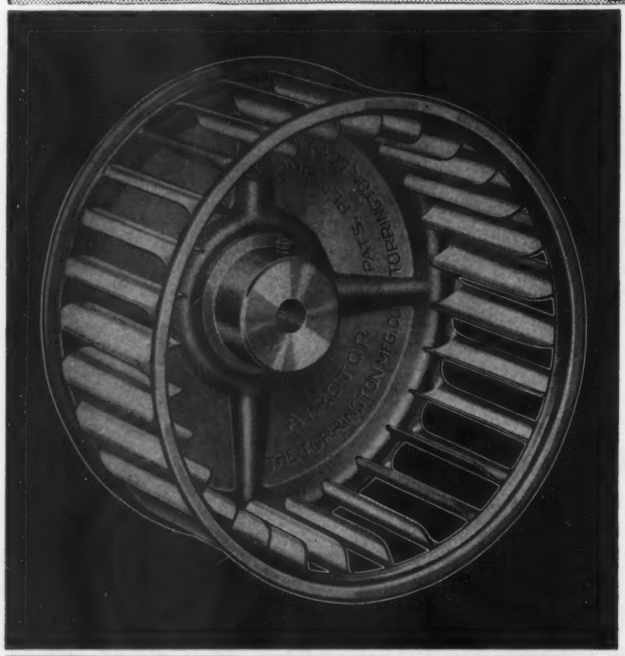

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Here is EXACTLY what we believe you want . . . a much better blower wheel at a much lower price. In this new and unique design, Torrington engineers have produced a light weight, smooth running wheel of extreme rigidity and high efficiency. Several sizes already available, the new Torrington Airotor Blower Wheel will soon be manufactured in ALL sizes . . . both single and double widths. Write for prices and complete specifications.

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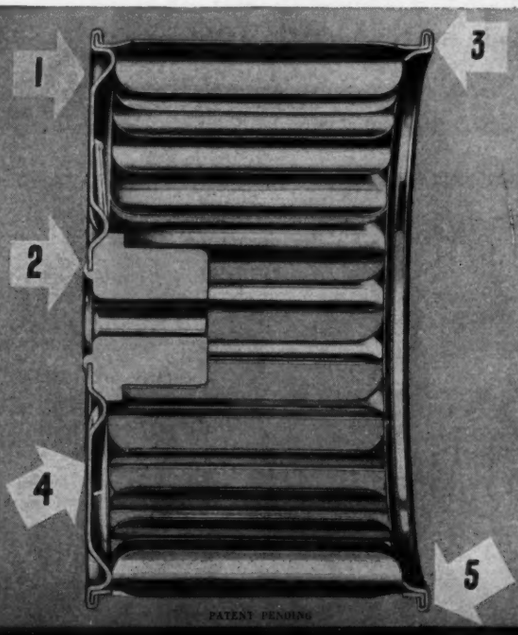
2. Hub fitted and fastened securely to a cone shaped socket to insure concentricity and rigidity.
3. Deep formed concentric rib which insures trueness of wheel. This rib bears against the end of blades to minimize cantilever blade deflection.
4. Deep formed radial ribs blending into hub socket, thereby stiffening back of wheel and resisting deflection by thrust against hub.
5. Three thicknesses of metal making for a maximum strength.
6. Minimum number of parts (4 including hub) assembled without rivets or welds.



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COLD FINISHED
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DARDELET RIVET and MACHINE BOLTS
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ELECTRICAL
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STAINLESS STEEL
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The Mark of Quality

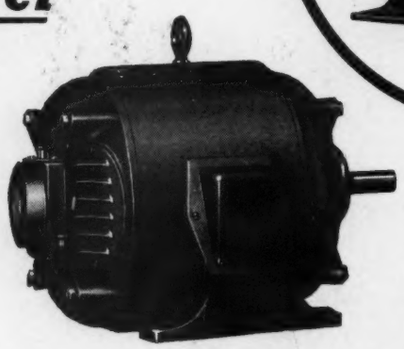
USS

UNITED STATES STEEL

For All Heating and Ventilating Applications

Your Customers are Assured Maximum Satisfaction with the Correct

Century MOTOR



You and your customers cannot expect peak performance and complete satisfaction from an installation equipped with "just any" electric motor. The complex demands of heating, cooling and ventilating installations require a motor *engineered* to fit the individual job, to meet the requirements of the device it drives and the surroundings in which it must operate.

That's why so many manufacturers, dealers and service men throughout the country specify Century Motors. For the complete Century line, with its wide variety of types and sizes from fractional to 600 horsepower, makes possible *correct* motor selection and application.

Where quiet operation is a sales feature, where high starting torque is necessary, where the ability to start and accelerate to full speed without over motoring is important, or where protection against moisture in damp basements is necessary—you'll find the proper Century Motor for every need.

Century Motors established an enviable reputation driving blowers, fans, pumps, compressors, unit heaters, oil burners and stokers, long before the combination of such units was known as air conditioning. Since the earliest days of the automatic heating and cooling industry, Century engineers have closely followed every development and Century Motors have kept pace with the industry's requirements.

You'll find that Century Motors offer you and your customers complete satisfaction and economical performance. For full information, call in your nearest Century Motor Specialist. His years of experience in proper motor selection and application are at your service—you'll find his advice pays you well.

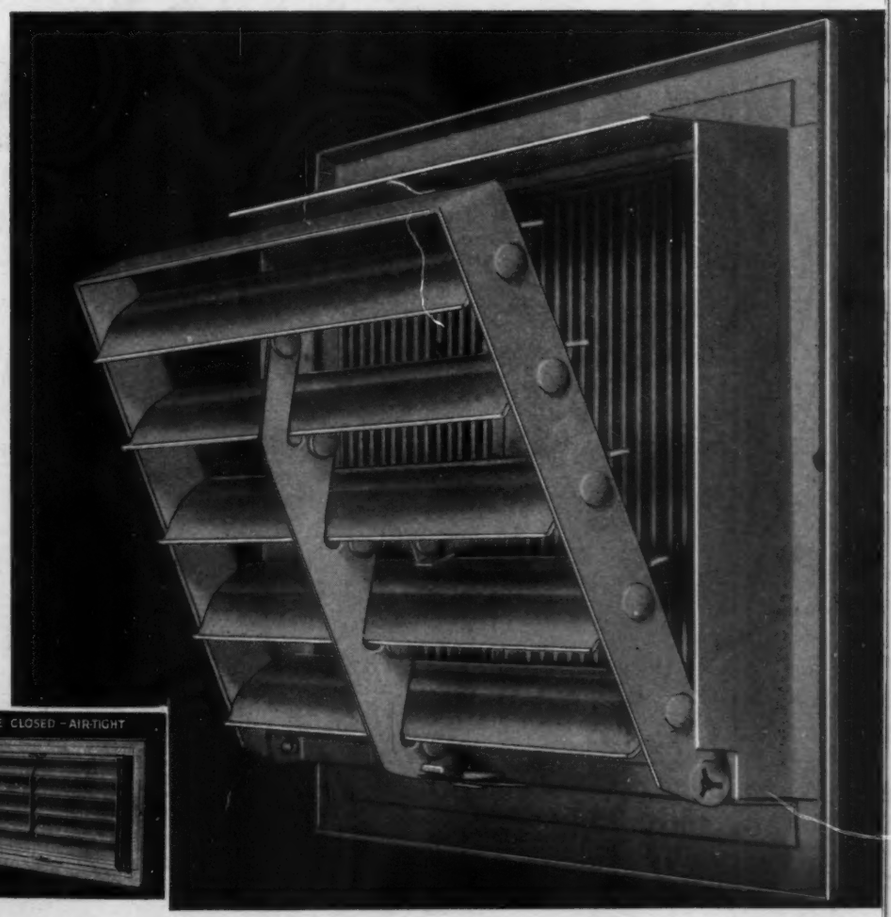
CENTURY ELECTRIC COMPANY
1806 Pine Street St. Louis, Missouri
Offices and Stock Points in Principal Cities

Century MOTORS

One of the Largest Exclusive Motor Manufacturers in the World

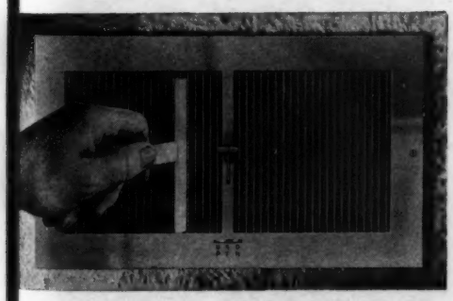
USE H&C REGISTERS with the INCOMPARABLE TURNING BLADE VALVE

It's the Cheapest and Best Good Will Builder in the Air Conditioning Business



The TURNING BLADE VALVE, used in H & C Nos. 75 and 86 Registers, is the only directional valve which when open extends back the full depth of the duct, smoothly dividing and turning every bit of the air flow with equal velocity to every portion of the register face. The result is less turbulence, less resistance and better distribution to the farthest parts of the room.

Closed, the turning blade valve is air-tight. To adjust the blades to UP, STRAIGHT, or DOWN requires just a turn of the regulator at the front of the register as shown at left.



The H & C No. 75 Design incorporates both the Turning Blade Valve and quick adjustability to any sideway deflection desired. Sideway deflections are quickly obtained by simply twisting the flexible fins with tool furnished with each item.

Current Catalogs—No. 40AC (Air Conditioning Registers)—No. 37 (Gravity Registers)—also, 7th Edition Pocket Guide. If not on hand, write us.

Many a contractor, accustomed to selecting his registers chiefly on the basis of lowest price, has come to learn that it's far better business to use H & C Registers with the incomparable TURNING BLADE VALVE on practically all of his jobs.

The reason is simple. RESULTS ARE UNIFORMLY BETTER! Distribution is more even, cold spots and "draft sensations" are eliminated, the customer obtains the maximum of comfort; and that's what COUNTS! Thoroughly satisfied customers are enthusiastic customers and will do more to help you get new business than any other single factor you could employ.

Try using H & C Registers with the TURNING BLADE VALVE on your next few jobs. You'll find that the relatively small cost differential between them and the most inexpensive registers available, *is the cheapest and best good-will builder in the air conditioning business.*

Though definitely superior in performance, H & C Registers with the Turning Blade Valve cost no more than registers with ordinary multi-shutter valves.

HART & COOLEY MANUFACTURING CO.

Warm Air Registers • Air Conditioning Grilles • Damper Regulator Sets • Dampers • Chain • Pulley

FACTORY AND ENGINEERING SALES OFFICE:

HOLLAND (H&C) MICHIGAN

Chicago Office: 61 W. Kinzie St. Philadelphia Office: 1600 Arch St.

COMING SOON...

The January 1941 ANNUAL DIRECTORY NUMBER

ONCE more . . . this time for the ninth successive year . . . AMERICAN ARTISAN presents to the trade the COMPLETE, ORIGINAL, AUTHORITATIVE Directory of Residential Air Conditioning, Warm Air Heating and Sheet Metal Equipment . . . as part of the January 1941 Issue.

This Directory for years has been accepted as the real source of accurate, concise information on "who makes it" and where they are located. The January 1941 Number is now in the process of preparation. The Directory is being completely revised to include all the new products and new sources of supply which have appeared since the last issue. Every manufacturer's line is being checked and re-checked to make sure that he is properly listed under every product he makes, with all his trade names and his correct address.

No regular editorial space will be sacrificed for the sake of the Directory Section in this January Issue. Our editors are as usual selecting a group of outstanding and permanently valuable articles on residential air conditioning, warm air heating and sheet metal contracting subjects that will make this Directory number as much a reference book from an article standpoint as it will from that of product specification and purchase.

You'll find this coming Directory issue to be probably the largest and most complete of any to date. Further information on request . . . just drop us a line.

MANUFACTURERS

Here is a monthly issue—and it comes only ONCE a year—in which your advertising lives ALL YEAR. After they have studied its many articles and data dealing with current problems, thousands of contractors and wholesalers will preserve the January issue for eleven 1941 months more . . . to use as a buying and specifying guide. Many will turn to the advertising pages seeking additional information about your products after finding them listed in the Directory Section. Make it easier for them to order from you—make a full showing of your line. SPACE RATES THE SAME AS FOR ANY OTHER ISSUE.

Closing date is December 15th . . . send us your reservation NOW!

AMERICAN ARTISAN

6 North Michigan Avenue Chicago, Ill.

PLEASE RUSH!

Do you sometimes wish there were more hours in a day during the busy autumn months? One way to save valuable time is to group and place your orders where you know both the quality and prices are right and all of the materials you need are carried.

OSBORN maintains one of the country's largest and most up-to-date stocks in order to give sheet metal men quick action on the multitude of items which their work requires. The thousands of shops which make use of this service will tell you that it not only saves time in ordering, but on the job too. That is because OSBORN-made materials are more uniform as to size, fit better and assemble faster. Try OSBORN products on your work and prove this for yourself.

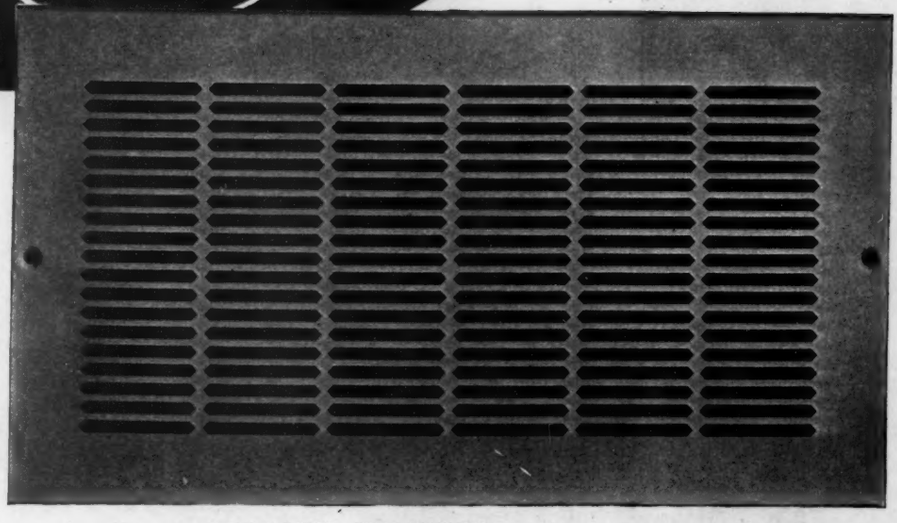
A DEPENDABLE SOURCE OF SUPPLY FOR 81 YEARS

THE J. M. & L. A.
OSBORN Co
CLEVELAND, OHIO
BUFFALO • CINCINNATI • DETROIT
Manufacturers—Distributors of Metals and Metal Products

FOR LOW-COST HOMES

Waterloo REGISTERS

New R-600 Series



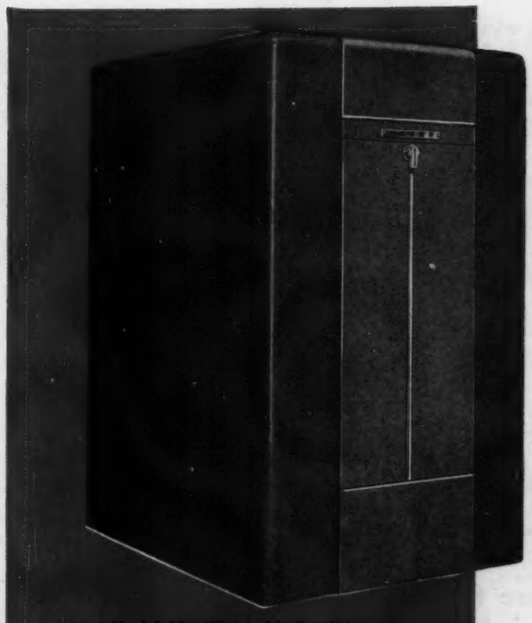
Waterloo REGISTERS

Contractors and buyers approve the smart appearance and quality built into this new line of low cost registers. Exclusive R-600 advantages include—Sponge Rubber Gaskets for all supply registers—Cadmium plated counter-sunk screws for attaching to wood or metal—and a complete selection of finishes to meet every decorating requirement. Yet with all these features, R-600 Registers are offered at the very lowest prices. Write today for details on the new big-value R-600 series registers.

WATERLOO REGISTER COMPANY

WATERLOO, IOWA **SEATTLE, WASH.**

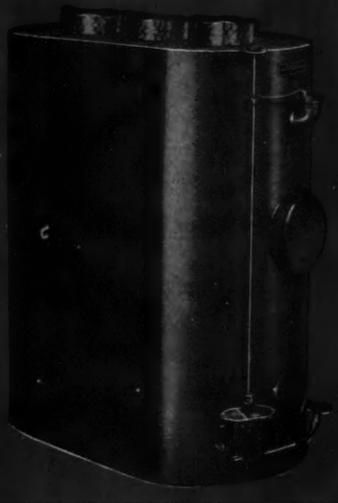
Representatives in all Principal Cities



Model 120 Winter Air Conditioner

Model OA-63 Fastemp Furnace

Model OB-60 Fastemp Furnace



Over 50,000 old furnaces go to the junk heap this year!

NORGE

FASTEMP FURNACES

give you *exclusive selling features* that are *years ahead* of what you've seen!

Cash in on this huge replacement market with Norge Fastemp Furnace units—revolutionary new quality units at sensationally low prices based on modern mass production.

4 ***Complete Package units cover 90% of all your jobs***

3 of these units cover 65% of your jobs AT PRICES THE SAME AS HAND-FIRED UNITS—one model priced about the same as a good "room heater"!

PERFORMANCE UNSURPASSED
—really great economy with abundant heat output. Perfect heat control. Safe to leave—cannot overheat.

DRAMATIC ADVERTISING
—colorful booklets; lively newspaper mats to reach *your* prospects through your local paper.

MODEL 120 WINTER AIR CONDITIONER: 120,000 B.T.U. at bonnet, low cost, basement or ground floor installation, oil or gas.

MODEL OA—63 FASTEMP FURNACE: 63,000 B.T.U., oil-burning, ground floor, pit or basement installation. 800 C.F.M. forced air. Wall control.

MODEL OB—60 FASTEMP FURNACE: 60,000 B.T.U., oil-burning, gravity, basement or pit installation.

MODEL OC—60 FASTEMP FURNACE: 60,000 B.T.U., oil-burning, gravity floor furnace, needs only 40" pit under floor.

Never before have so many original, exclusive and important features been offered in one line of heating equipment. Wire or write for literature and prices—and a great profit opportunity.

NORGE HEATING and CONDITIONING DIVISION
BORG-WARNER CORPORATION, DETROIT, MICHIGAN

Send the Coupon

Date_____

Norge Heating and Conditioning Division
Borg-Warner Corporation
670 East Woodbridge St.
Detroit, Michigan

RUSH me information about your line of heating equipment.

Name_____

Address_____

City_____ State_____

AA-117

Star performance at the heart of the gas appliance—The BURNER!

Give Your Gas Appliances the Advantage Of BARBER BURNER Equipment

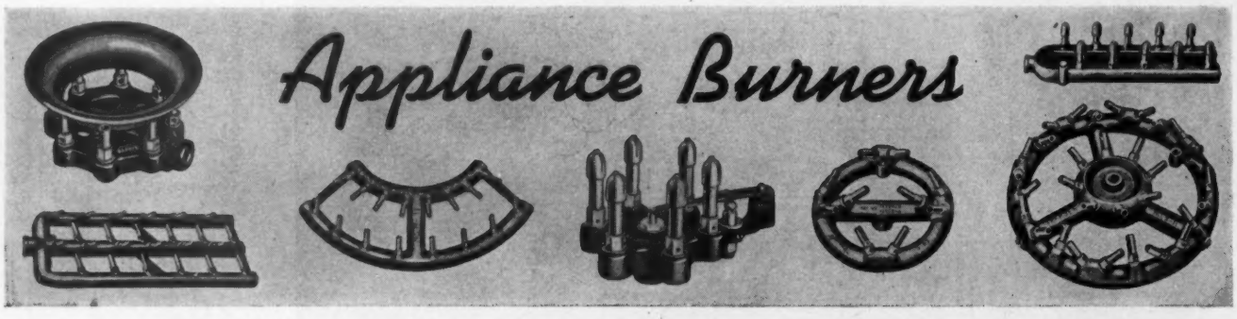
Barber Gas Burners are recognized everywhere for outstanding performance and fuel economy. Their 20-year record of leadership is further emphasized by the fact that approximately 175 nationally known appliance manufacturers have adopted Barber Burners as standard equipment for their products.

The clear superiority of Barber Burners is based on their exclusive combustion principle. Above the gas orifice in the jet tubes is an auxiliary air feed which creates a vacuum as the mixture leaves the jets, projecting into the flame the additional air necessary for efficient combustion on increased gas pressure. Patented Barber Jets deliver a flame temperature of 1900° on atmospheric pressure. They produce a correctly directed and controlled flame, far more effective than that of the primitive "Venturi Tube" principle employed by nearly all other burners. There is no substitute for Barber efficiency.

It will pay you to see that gas appliances, including heating and air conditioning equipment, which you buy, sell, make or sponsor are equipped with Barber Units. Nothing finer can be said about any gas appliance than—"it is Barber-equipped."

Only a few typical Barber designs shown here. We are gas burner specialists, and offer you freely our laboratory and engineering facilities on the design and manufacture of burner units appropriate for your specific purposes. Write for complete Catalog and Price List on Burner Units for Gas Appliances, Conversion Burners for Furnaces and Boilers, and Gas Pressure Regulators.

THE BARBER GAS BURNER COMPANY, 3704 Superior Avenue, Cleveland, Ohio
Address Michigan Inquiries to The Barber Gas Burner Co. of Michigan, 4475 Cass Ave., Detroit



BARBER *Automatic* JET GAS BURNERS

All our water level control experience *in a valve that* MAKES HUMIDIFICATION UNFAILING

"WHY doesn't someone build an automatic valve that will *unfailingly* maintain the water level in a humidifier pan?" That often repeated question was not the kind to be passed up by an organization that had built its whole career around water level control.

The big word in that question is *"unfailing"*. Could it be done? We went to work on it—put into its solution all that we have learned in building the water level controls that for many years have led all others in the heating boiler field. That solution is illustrated here—the McDonnell Humidifier Water Control for warm air furnaces.

You have here a construction that recognizes the tough conditions under which a valve of this kind operates—the dirt and foreign matter that plugs up valve orifices; the lime and scale that causes plugging or sticking in the open or closed position. To get around these conditions we devised a "snap action" valve. Unlike former valves, it has no slightly cracked position in which it merely seeps or dribbles. When the water level drops a quarter-inch it *snaps* wide open. The resulting full stream of water flushes the valve seat clean. When the water level has been restored the valve closes with the same snap—absolutely leak-tight against water pressure up to 150 pounds.

Throughout, this humidifier valve incorporates typical McDonnell refinements—valve cone machined from bar stock; tough, almost indestructible special alloy seat; finely made parts; adjustable float level. Despite these refinements, price is moderate. It is available as:

No. 217—Complete with copper tubing and fittings as illustrated below.
No. 117—Same as No. 217 but without copper tubing and fittings.
No. 17—Valve and float only (without float chamber).

Write for engineering data bulletin

McDONNELL & MILLER, 1318 Wrigley Bldg., Chicago

"Doing One SAFETY Thing Well"

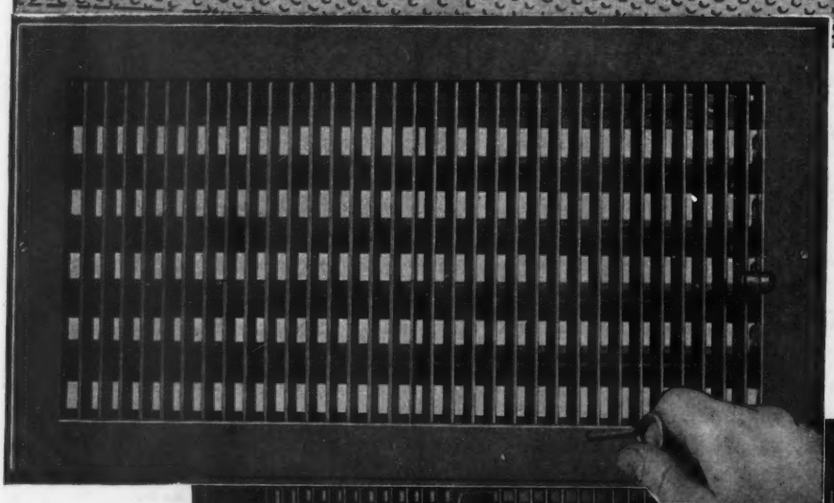
Now available with SKUTTLE HUMIDIFIER

● The McDonnell Snap Action Humidifier Water Control is available with different types of Skuttle Evaporating Pans to form a complete unit as illustrated above. It is furnished with 18", 20", 24" and 30" pans in three types (M.D.S., M200, M200A), with and without ceramic inserts. Complete humidifiers of this type can be ordered from the J. L. Skuttle Co., Detroit, Mich.

McDONNELL HUMIDIFIER WATER CONTROLS

Your Jobber Stocks Them

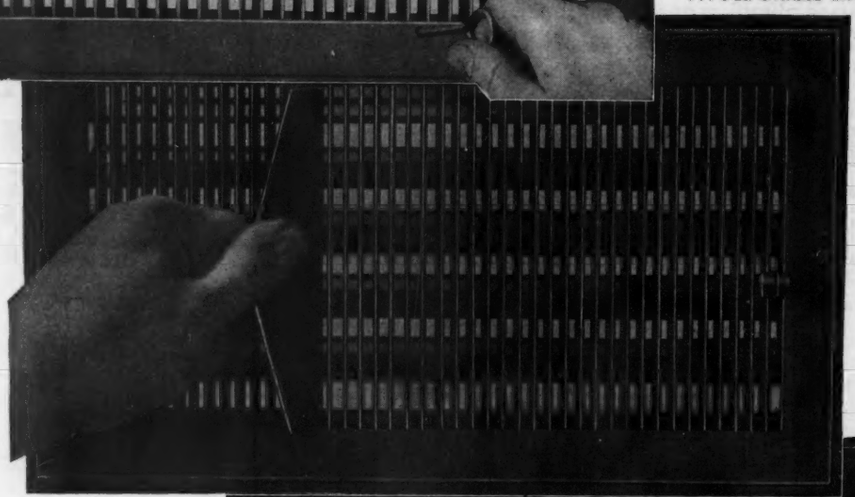
PREMIER SHOWING OF 1941 STANDARDIZATION OF THE FINEST U.S. AIR-CONDITIONING REGISTERS



FOUR-WAY FLOW ADJUSTABLE BAR

STYLE 249—Sidewall Type
STYLE 252—Baseboard Type—One-Piece
STYLE 251—Baseboard Type—Two-Piece
STYLE 176—7/8 Inch Baseboard Vent
STYLE 178—Flat Sidewall Vent

Key-Pin Operation Controls Side Flow. Lever Operation Controls Up and Down Flow. A FULL GRILLE LINE that has NO EQUAL.



Flex-Wrench sets Grille-Bars to Desired Angle of Deflection. Lever Controls Up and Down Flow.

Positively the BEST in FLEX-BAR REGISTERS

FOUR-WAY Flow Flexible Bar

STYLES

256—Sidewall
267—Baseboard—One-Piece
272—Baseboard—Two-Piece
176—7/8 Inch Baseboard Vent
178—Flat Sidewall Vent

COMPARE With OTHERS and ORDER U. S.

NEW LOW COST LINE

Neat Slotted Design for 1941 Immediately Available.

STYLE 103-N—Sidewall Type
STYLE 109-N—Baseboard Type
STYLE 115-N—7/8 Inch Baseboard Vent
STYLE 118-N—Flat Sidewall Vent

EXCELS ALL LINES of LOW-COST NON-DIRECTIONAL FLOW Forced-Air Registers.

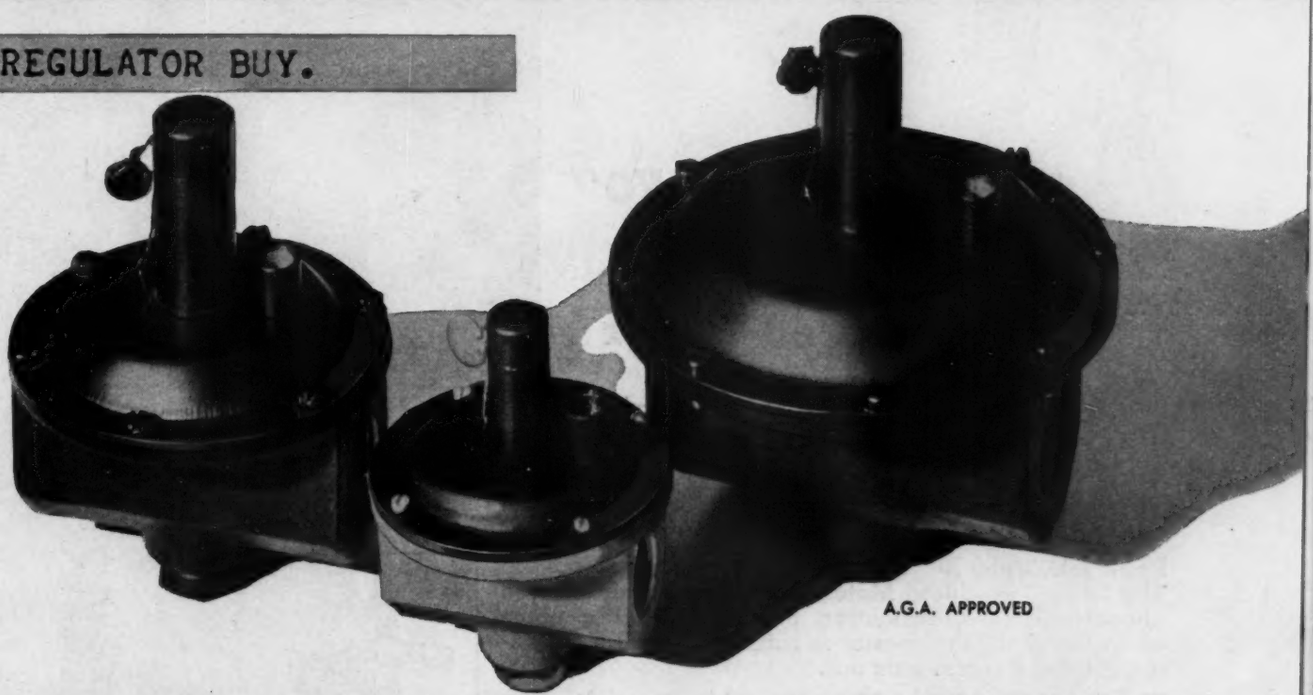
UNITED STATES REGISTER CO.

BATTLE CREEK, MICHIGAN

MINNEAPOLIS • KANSAS CITY • ALBANY • SAN FRANCISCO • NEW YORK, N. Y.

ANNOUNCEMENT--

HERE IS GENERAL CONTROLS NEWEST LINE - SERIES V-300 LOW PRESSURE GAS REGULATORS - COMPARE THEIR THREE BIG ADVANTAGES - HIGH CAPACITY - CLOSE REGULATION - LOW COST - RESULTS WILL SHOW THEM TO BE YOUR BEST REGULATOR BUY.



A.G.A. APPROVED

Careful research and rigid tests precede every announcement of a new General Controls product. You can take that for granted.

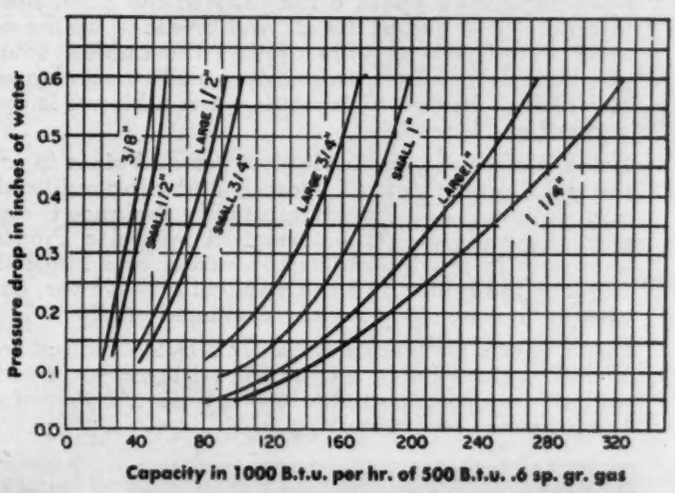
This is why we've so positive the new V-300 Series Low Pressure Gas Regulators will fulfill every one of your requirements for a high quality, reliable, trouble-free valve, with high capacity and close regulation, yet which is small and compact.

Regulator sizes range from ⅜" to 1¼" I.P.S., with standard outlet pressure sealed at 3½ inches water column, but with adjustable outlet range of from 2" minimum to 5" maximum.

All internal parts are resistant to corrosion for all natural and manufactured gases. ⅜" and ½" small regulator bodies are of sand cast aluminum; larger size bodies are of cast iron. Diaphragms are of leather, oil treated for sensitivity and long life. Each regulator is tested, rigidly inspected and checked for setting, leakage and lock-up, then sealed at the desired pressure.

Specify General Controls V-300 Series Low Pressure Gas Regulators. Request full engineering details and specifications. Complete stocks available at all General Controls Branches.

PRESSURE DROP CURVES IN TERMS OF 500 B.T.U. GAS



Capacity in 1000 B.t.u. per hr. of 500 B.t.u. .6 sp. gr. gas

GENERAL CONTROLS

400 East Ohio Street, Chicago, Illinois • 25 North Live Oak Street, Houston, Texas • 1505 Broadway, Cleveland, Ohio • 421 Southwest Boulevard, Kansas City, Missouri • 915 Bryant Street, San Francisco, California • 267 Fifth Avenue, New York City • 801 Allen Avenue, Glendale, California • 6432 Cass Avenue, Detroit, Michigan 687 Boylston Street, Boston, Mass. • *Distributors in all principal cities*

Comfort

SHOULD NOT STOP AT THE ANKLES!

Eliminate "Cold 70" with the DELCO Two-Speed Motor

Don't let "Cold 70" give your customers "cold feet." The Delco Two-Speed Motor for blowers eliminates the uncomfortable stratification of air that takes place when the room thermostat is satisfied and the single-speed blower motor cuts out.

The Delco Two-Speed Motor on a blower application operates at slow speed a majority of the time, maintaining circulation of the air and breaking up the cold layer that tends to settle around the ankles. It also practically eliminates temperature over-run and greatly reduces the drafts which result when a blower is operating at high speed.

Delco motors are available in types and sizes to meet the requirements of all heating and air-conditioning applications. All are dynamically balanced on a specially-built machine, designed by Delco Products engineers to provide quieter operation and longer life for both the motor and the application—blower, compressor, stoker, oil burner or packaged unit.

Delco power for Sealed Units and Delco motors from 1/8-h.p. up are widely used in the refrigeration, heating and air-conditioning fields. Consult the Delco Products Engineering Department.

Precision Manufacturing Plus

DELCO THERMOTRON for complete protection against overload and overheating. Listed by Underwriters.

DELCO CENTRIFUGAL SWITCH for exceptionally quiet, positive starting.

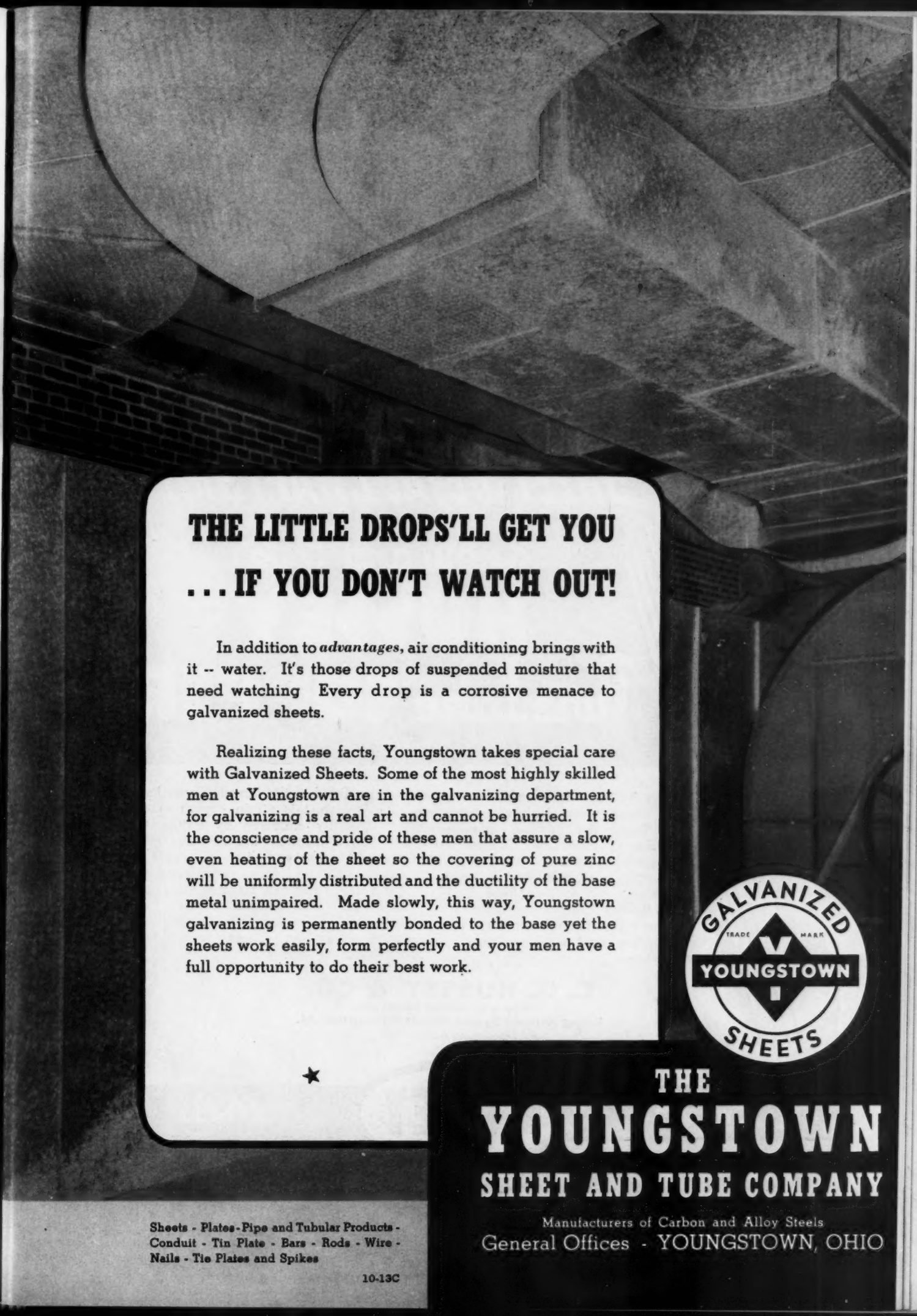
END-PLAY TAKE-UP DEVICE to further reduce vibration—particularly important in V-belt applications.

GOOD APPEARANCE that harmonizes with modern streamline appliance design.

Nationwide service through United Motors Service.

DELCO MOTORS

DIVISION OF GENERAL DELCO PRODUCTS DAYTON, OHIO MOTORS CORPORATION



THE LITTLE DROPS'LL GET YOU ... IF YOU DON'T WATCH OUT!

In addition to *advantages*, air conditioning brings with it -- water. It's those drops of suspended moisture that need watching Every drop is a corrosive menace to galvanized sheets.

Realizing these facts, Youngstown takes special care with Galvanized Sheets. Some of the most highly skilled men at Youngstown are in the galvanizing department, for galvanizing is a real art and cannot be hurried. It is the conscience and pride of these men that assure a slow, even heating of the sheet so the covering of pure zinc will be uniformly distributed and the ductility of the base metal unimpaired. Made slowly, this way, Youngstown galvanizing is permanently bonded to the base yet the sheets work easily, form perfectly and your men have a full opportunity to do their best work.

★

GALVANIZED TRADE MARK YOUNGSTOWN SHEETS

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

General Offices - YOUNGSTOWN, OHIO

Sheets - Plates - Pipe and Tubular Products - Conduit - Tin Plate - Bars - Rods - Wire - Nails - Tie Plates and Spikes

10-13C

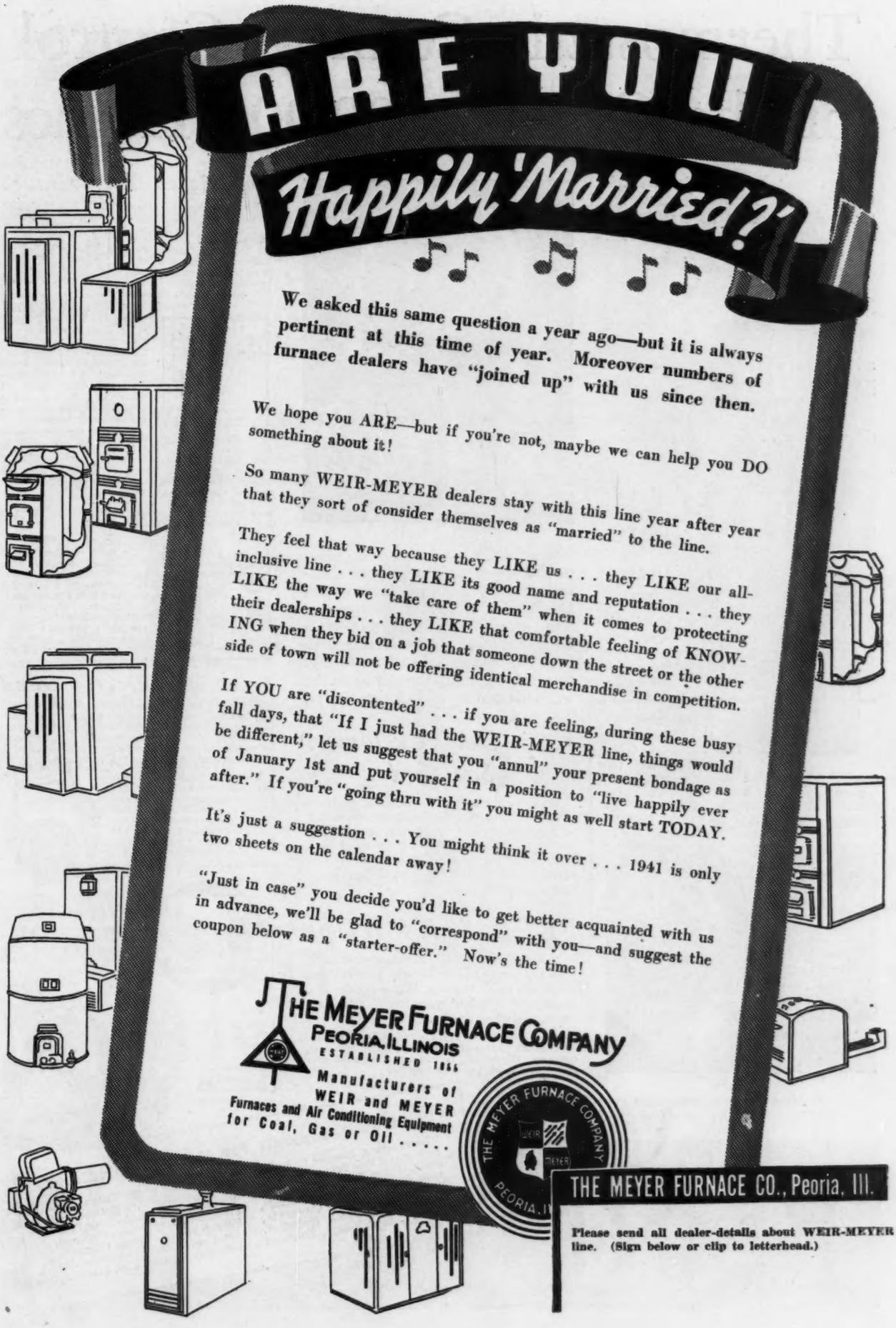
SHEET METAL CRAFTSMEN Know and Prefer HUSSEY Pure Lake COPPER

Through more than four generations, metal craftsmen have preferred the unusual qualities of Hussey Pure Lake Copper. Possessing superior attributes of beauty, workability and durability peculiar only to Pure Lake quality, Hussey Copper continues to be the prime favorite among discriminating sheet metal craftsmen everywhere.

Mined in the famous Great Lakes region, this virgin copper is especially endowed by nature to better withstand the corrosive attacks of time and clime—a copper you can pridefully recommend and use with profit for any sheet metal job, large or small. There's a Hussey Sales or Warehouse service near you. Check your local source of supply

C. G. HUSSEY & CO.
(DIVISION OF COPPER RANGE CO.)
Rolling Mills and General Offices: PITTSBURGH, PA.
Warehouses in Principal Cities

Copper **HUSSEY** *Brass*

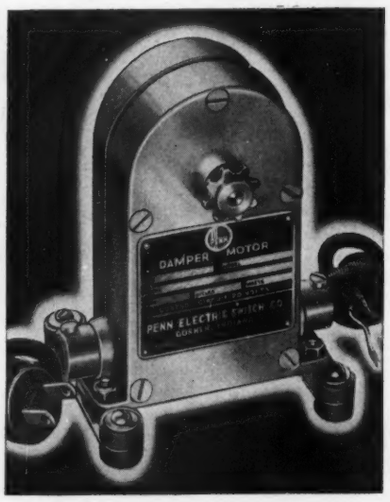

ARE YOU
Happily Married?
We asked this same question a year ago—but it is always pertinent at this time of year. Moreover numbers of furnace dealers have "joined up" with us since then.
We hope you ARE—but if you're not, maybe we can help you DO something about it!
So many WEIR-MEYER dealers stay with this line year after year that they sort of consider themselves as "married" to the line.
They feel that way because they LIKE us . . . they LIKE our all-inclusive line . . . they LIKE its good name and reputation . . . they LIKE the way we "take care of them" when it comes to protecting their dealerships . . . they LIKE that comfortable feeling of KNOWING when they bid on a job that someone down the street or the other side of town will not be offering identical merchandise in competition.
If YOU are "discontented" . . . if you are feeling, during these busy fall days, that "If I just had the WEIR-MEYER line, things would be different," let us suggest that you "annul" your present bondage as of January 1st and put yourself in a position to "live happily ever after." If you're "going thru with it" you might as well start TODAY.
It's just a suggestion . . . You might think it over . . . 1941 is only two sheets on the calendar away!
"Just in case" you decide you'd like to get better acquainted with us in advance, we'll be glad to "correspond" with you—and suggest the coupon below as a "starter-offer." Now's the time!
THE MEYER FURNACE COMPANY
PEORIA, ILLINOIS
ESTABLISHED 1855
Manufacturers of
WEIR and MEYER
Furnaces and Air Conditioning Equipment
for Coal, Gas or Oil . . . . .
THE MEYER FURNACE CO., Peoria, Ill.
Please send all dealer-details about WEIR-MEYER line. (Sign below or clip to letterhead.)

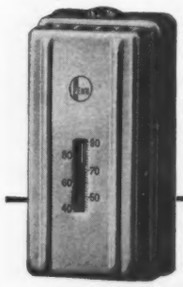
Thermostatic Comfort Control for the Other 7,500,000 Homes

● Last year, Penn Electric Switch Co. announced Draftender Comfort Control for homes that still heat with hand-fired systems—steam . . . hot water . . . warm air. Enthusiastic heating men everywhere were quick to see the profit possibilities in this mass market of 7,500,000 centrally heated homes—hand-fired.

And why not? Automatic heat advertising and sales activities have made the "3 out of 4" who still fire by hand want automatic temperature control—for its comfort . . . its convenience . . . its saving in labor and fuel . . . its health protection . . . its fire protection.

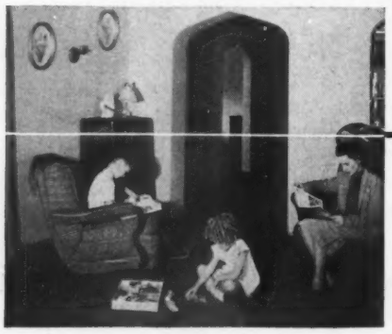
Many of the "3 out of 4" can't or won't buy automatic heating systems *this year*. But you can do like other heating men are doing, *profitably*—get them on your satisfied customer list with Temtrol and Draftender. Here is an inexpensive hand-fired control system that *keeps them satisfied* — Temtrol to keep temperature always uniformly comfortable . . . Draftender to do the work of opening and closing drafts.





Plus Advantages of Temtrol

Only with Draftender Damper Control systems can you get the advantages of Temtrol, Penn's auxiliary heat actuated room thermostat—the standard temperature control on many leading makes of automatic heating equipment. Assures Comfort Zone Control in the "lived in" portion of the home—from the floor up FOUR FEET.



Keep Coal Customers Satisfied

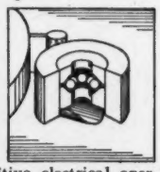
Wide-awake solid fuel dealers, with an eye to the future, are equipping customers' heating plants with Draftender control, to assure maximum comfort from solid fuel. There's no better way to keep customers satisfied with your fuel and your service—and do it profitably.

FREE *Sales Helps*

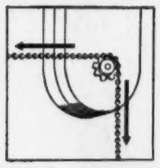
Modern circulars, demonstrators and displays are available to help you sell this 7,500,000 home market. Write for details, specifying whether you are a manufacturer, jobber or dealer.

Penn Electric Switch Co., Goshen, Indiana. In Canada: Powerlite Devices, Ltd., Toronto, Ontario. Branches, representatives and distributors in all principal cities.

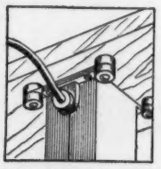
Top-Notch Performance



Exclusive design features and precision manufacture contribute to the fine performance and long life of the Draftender motor. Permanently lubricated self-centering, self-aligning ball bearings carry both ends of the motor shaft. Reduce friction and wear.



Positive electrical operation, both on opening and closing of drafts is provided, while retaining the advantages of the two-wire Penn Temtrol. Sprocket and hardened chain drive is simple to install . . . dependable in operation . . . provides reserve power.



Draftender, a motor that is unusually quiet in operation, is further insulated against annoying transmission of noise to living quarters of the home by this four-point mounting in resilient, live rubber mounting feet. Quickly and easily installed.

In spite of its compactness, Draftender is a transformer-type motor, permitting control by means of a standard low voltage heat-anticipating thermostat, without the necessity of installing a separate transformer. Plug-in type line voltage connector regularly supplied.

3 out of 4 Fire by Hand

3 out of 4 owners of central heating plants still fire by hand. Figure the tremendous sales possibilities in your own territory. This is a profit opportunity you can't afford to overlook. Get complete information now on sales helps available for your use in getting your share of this business.

Two-color double fold leaflets, imprinted with your firm name, address and telephone number are available for your use. Slip into envelopes with invoices or make a mailing to live prospects on your mailing list. A sure-fire way to arouse interest . . . dig up leads.

Two double postcards are available for making a series of two inexpensive lead producing mailings to prospects. Return postcard makes it easy for prospects to supply information about their heating plants . . . ask for more information.

Five color metal display panel provides an attractive, operating display of Temtrol and Draftender. Panel is available FREE. Write for information. Ideal for house to house work is the enclosed demonstration case, also available FREE.

More information on what Penn Controls will do for you—One of a Series.

PENN

Penn-Built Controls for Many Applications

Thermostats, Bonnet Controls, Ductstats, Fire Protection Controls, Water Temperature Controls, Boiler Pressure Controls, Boiler Water Level Controls, Humidistats, Stack Switches, Stoker Timer Relays, Solenoid Gas Valves, General Purpose Relays, Solenoid Refrigerant and Water Valves, Refrigeration Pressure and Temperature Controls, Water Valves, Pump Controls, Air Compressor Controls, Air Volume Controls, Line Starters.

Big news ...FOR SMALL HOME CONDITIONING!

NEW SIZES — five of them from 65,000 to 150,000 Btu./Hr. at the bonnet. The *right* size for any home. (Also De Luxe models up to 600,000 Btu's.)

NEW LOW PRICES — without sacrifice of Fitzgibbons Directaire quality, due to redesign which lowers manufacturing cost, while improving efficiency.

QUALITY MATERIALS — primary heating surface is of heavy gauge copper-bearing steel plate, in an electrically welded, positively gas-tight and leak-proof assembly.

NEW QUIETNESS — due to oversize, low-speed fan, balanced both dynamically and statically, running on roller bearings mounted in rubber pillow blocks.

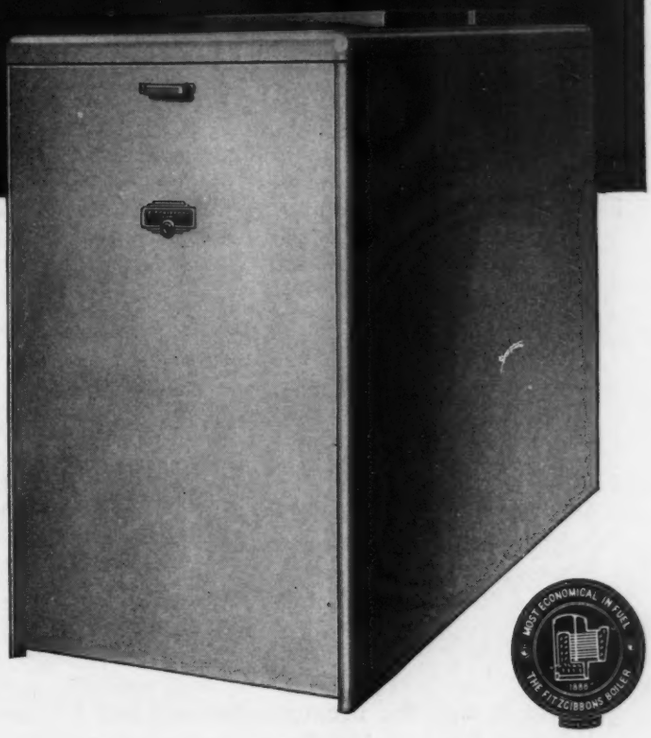
POSITIVE OPERATING HUMIDIFIER automatically controlled, ample in evaporating capacity, distinctive design.

FOR OIL OR GAS FIRING — with large firing chamber insuring complete combustion and low fuel consumption. (Special models for use with stokers.)

BEAUTIFUL IN APPEARANCE — with enameled steel jacket of enclosing type, ample to accommodate practically any oil or gas burner equipment.

COMPACT, SIMPLY INSTALLED — occupying minimum floor space, making basement planning easy, due to Fitzgibbons unit "Weldseal" construction and quickly applied colorful jacket.

FITZGIBBONS
ANNOUNCES: *IMPROVED, EXPANDED LINE OF*
DIRECTAIRE CONDITIONERS



Get set

for new business, with full details of this sales building line of conditioners — MAIL THE COUPON today

FITZGIBBONS BOILER COMPANY, INC. AA-10
101 PARK AVE., NEW YORK, N. Y.

Send me data on the new DIRECTAIRE for small homes

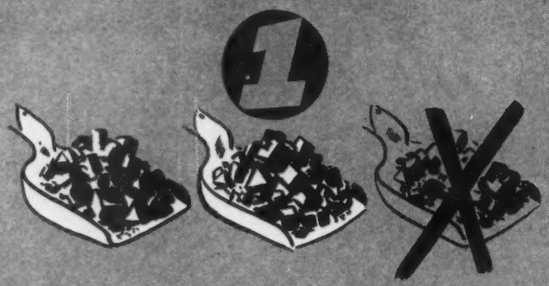
NAME.....

ADDRESS.....

CITY.....STATE.....

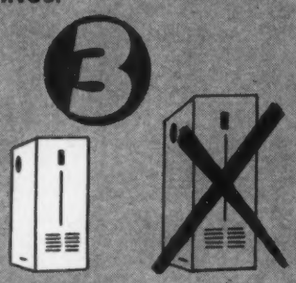
USE THE POWERFUL L·O·F WINDOW CONDITIONING CAMPAIGN TO HELP SELL YOUR EQUIPMENT

Window Conditioning (storm windows) helps your sales of automatic-heat and air-conditioning equipment in three ways. Here's how:



Window Conditioning reduces fuel bills —in many cases as much as 30%. WHEN FUEL BILLS ARE REDUCED MORE PEOPLE CAN AFFORD TO BUY THE EQUIPMENT YOU SELL AND PAY FOR IT OUT OF FUEL SAVINGS.

Window Conditioning helps get rid of the nuisance of foggy windows— excessive condensation that damages draperies, walls, rugs and woodwork finishes. This adds an advantage of Air Conditioning which makes a strong sales appeal to the customer.



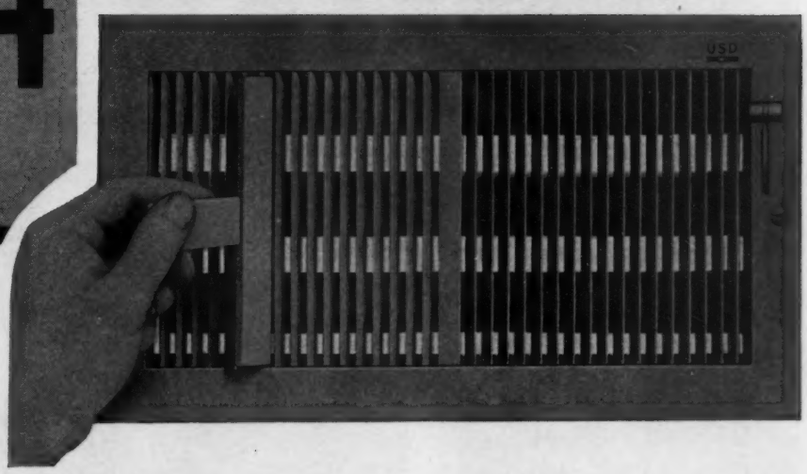
Window Conditioning permits the use of smaller and less costly heating equipment without impairing heating efficiency . . . WHERE PEOPLE CAN USE SMALLER HEATING EQUIPMENT, SALES RESISTANCE TO THE EQUIPMENT YOU SELL IS REDUCED.

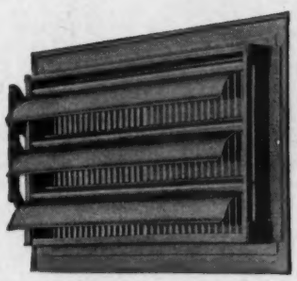
● Tie in with the dramatic, forceful L·O·F Window Conditioning Campaign—national advertising . . . radio . . . direct mail. It is creating thousands of storm window users clear across the cold belt. That means countless new opportunities to sell your equipment. And it will certainly be to your advantage to emphasize the merits of Window Conditioning in your contacts with home owners, home builders and building contractors. For it's an inexpensive, easily installed improvement that *reduces* the operating cost and *increases* the efficiency of the equipment you sell. Libbey·Owens·Ford Glass Company, Toledo.

LIBBEY·OWENS·FORD QUALITY GLASS

AUER AIRO-FLEX

the Register that's easier to adjust – and gives 4-WAY CONTROL

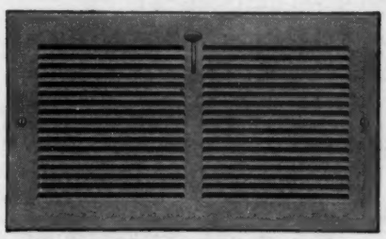




Back view of Airo-Flex No. 4432 Register

This popular Auer Airo-Flex "4000" Register has multi-louvre back-blade, operated by lever, which directs air flow at any angle upward, level, or as much as 22½° downward. Indicator on the face shows direction of flow. For sideway air direction, a simple adjustment of grille bars, at time of installation, gives you any desired combination or single flow—straight, right or left. Adjusting tool furnished.

The companion Airo-Flex "7000" Register is a somewhat simpler and more economical design, with single blade louvre, and with *horizontal* grille bars, adjustable in the same manner as the "4000".



Airo-Flex 7032 Single Louvre Adjustable Register

Auer also makes a fine mesh Fin-Flex adjustable air conditioning register, as well as several other designs shown in the complete Auer Register Book 40. All these are highly practical registers, easy to install and to adjust. It will pay you to see them at your supply house.

Send for complete Catalog illustrating all Auer Air Conditioning and Gravity Registers and Intakes. Separate Catalog "G" also available on Auer Grilles.

THE AUER REGISTER COMPANY, 3608 PAYNE AVENUE, CLEVELAND, OHIO

AUER DISTINCTIVE REGISTERS & GRILLES For Air Conditioning *and* Gravity

with Beth-Cu-Loy Galvanized Steel Sheets

There's nothing spectacular about this job, as sheet-metal work goes, but it illustrates the source of many an extra dollar for the enterprising contractor who did the work.

Plenty of markets, fruit stores, and grocery stores need counters like these. Few storekeepers, though, ever go out hunting for a contractor to do the job. In most cases where the need exists, it's up to the contractor himself to furnish the initiative.

It doesn't take a high-pressure sales technique to convince such a prospect, though. When you show him how he can dress up his store economically with sheet-metal counters, racks and bins, he'll be sold on the idea. And only one such job to start with can lead to a lot of profitable work later on.

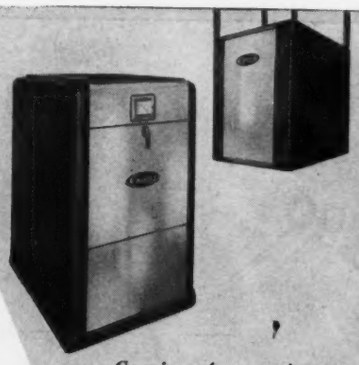
When you use Beth-Cu-Loy Copper-Bearing Galvanized Steel Sheets on such jobs, you give your customers double protection against corrosion for a fractional difference in cost. That's a good sales-clinching point in itself. You'll find, too, that Beth-Cu-Loy Sheets have the same easy workability you've been used to in other Bethlehem Galvanized Sheets.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

NOW...

Low Cost with Carrier Quality in a Complete New Line...



Carrier Automatic Furnace for radiator systems . . . plus the Home Air Conditioner, provide deluxe dual-system comfort for larger homes. Available for oil, gas or stoker-fired coal.

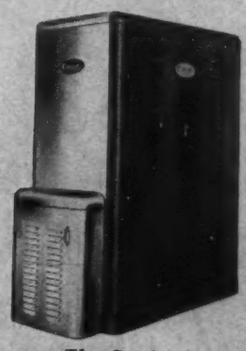
Carrier Home Weathermaker—Real Winter air conditioning for smaller homes—with Carrier quality throughout. For automatic comfort with oil or gas.

DEALERS NOW BEING APPOINTED

Progressive heating men look ahead to the day when "heating dealers" will be "year 'round *comfort* dealers," selling cooling as well as heating. That's why they'll welcome the sensational news of Carrier's New Dealer Franchise.

A Rare Opportunity

Now, to a limited number of responsible heating equipment dealers, Carrier offers a rare opportunity to tie up with air conditioning's *first*—and most *famous*—name . . . with a complete line of *automatic heating* and *winter air conditioning equipment* for homes . . . AND a ground-floor chance to get into the cooling end of the business on a sound and profitable basis.



The Carrier Home Weathermaker in larger capacities for medium and large size homes. Available for oil, gas or stoker-fired coal. Summer cooling may be added.

Carrier Room Humidifier: A new and profitable specialty. Adds adequate healthful humidity to dry, air-parched homes, offices, apartments.

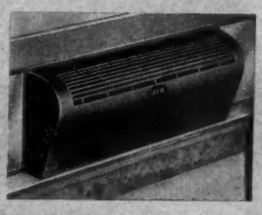
This is the Carrier Line for Year 'Round Profits

The complete line of Carrier Equipment for automatic heating and winter air conditioning includes:

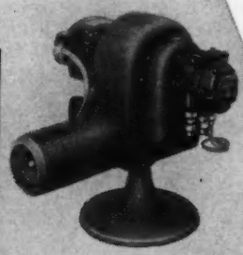
- *New low-cost, low-capacity Oil Burner*
- *New low-cost Boiler-Burner Units*
- *New low-cost Direct-Fired Units*

These new units are completely automatic; for oil, gas or stoker-fired coal. To the dealer Carrier is seeking, the winter-comfort equipment is familiar ground. When he needs to know about cooling, Carrier will help him. And there's no better place to learn the business than from the leader of the industry! The famous Carrier Room Weathermakers for Summer cooling, Carrier Room Ventilators and the new Portable Humidifiers add to year-'round business and profits.

No matter what line you carry now, it will pay you to investigate Carrier's New Dealer Plan. Write or wire now for complete information. Or mail the coupon.



Carrier Room Ventilator for low-cost year-'round comfort and hay fever relief. Sales increasing to homes and offices.



Carrier Oil Burner—backs your complete automatic heating line with the same famous name. Designed by Carrier experts for utmost economy and dependability.

AIR CONDITIONING'S *First Name*— **Carrier**

CARRIER CORPORATION, Syracuse, N. Y.
"Weather Makers to the World" Desk J 33
(In Canada, 30 Bloor Street, West, Toronto, Ont.)

Please send me complete details on the new Carrier Dealer Franchise.

Name.....

Company.....

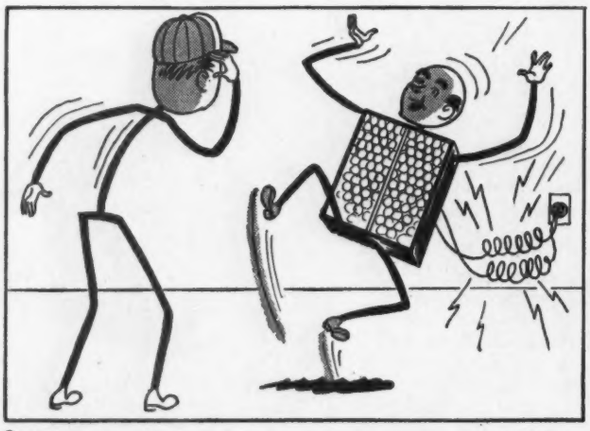
Address.....

1. Dust-Stop Man: I tell you, Jim, it's like sneezing at honest bucks, when you pass up those filter-replacement jobs.

Heating Contractor: Whatta you mean?

2. Dust-Stop Man: You haven't even started looking for forced warm-air furnace owners who need Dust-Stop* Air Filters.

Heating Contractor: Shucks! They don't even know they've *got* filters. So how can you sell 'em replacements?



3. Dust-Stop Man: That's easy. You can give them a 10,000-volt urge to buy new Dust-Stop filters without any trouble at all.

Heating Contractor: *Sounds* wonderful! But I'm from Missouri.

4. Dust-Stop Man: Yeah? Well listen to this from Toledo. The makers of Dust-Stops will *give* you the biggest and finest set of dealer sales helps ever offered in the air-filter industry.

Heating Contractor: Gee whiz! How can I get 'em?

5. Dust-Stop Man: Just ask your jobber or write the Dust-Stop people for the pamphlet that tells you all about the dealer helps. There are **FREE** reminder postcards, **FREE** mailing pieces, **FREE** filter-change labels and other swell sales tools.

6. Heating Contractor: Thanks for the advice. There's no time to lose. With all that material, I can get a honey of a profit out of Dust-Stop replacements. And probably sell lots of other services and equipment at the same time.

FIBERGLAS* DUSTOP* AIR FILTERS

*T.M. Reg. U. S. Pat. Off.

Made by Owens-Corning Fiberglas Corporation, Toledo, Ohio

DIRECT CANADIAN INQUIRIES TO FIBERGLAS CANADA, LIMITED, OSHAWA, ONTARIO

"I Married a Smart Husband He's a G-E Dealer!"

Mrs. D. Kerwin Twomey, wife of successful G-E Dealer of Biddeford, Maine, tells you how she feels about being a member of the great G-E family.

"WHY AM I TALKING about my husband's business? Simply because I'm mighty interested in it. I like it. And I know a lot about it because we've always made it a habit to talk things over together. We're really partners.

"He's proud of his success and I am too!

"As he says, every time he sells a G-E unit he makes another friend. It does the job promised and keeps the customer happy.

"I don't believe I know a soul who hasn't a refrigerator, a fan or something made by G-E. That's why he says it's easy to get to prospects and why they're *sold* on the name and reputation of General Electric.

"And he enjoys working with his distributor and the company representative. They give him a lot of special training and they are always handy when he needs help. They supply him with all kinds of literature and promotion material. And of course he benefits by the grand advertising G-E does.

"G-E Heating is the finest money can buy—

"It's a real blessing in any home. When my husband sells a G-E furnace or any of the other cooling or refrigeration equipment, he *knows* he is giving his customers the finest they can buy.

"I know G-E engineering and research couldn't produce anything but the finest. And that's exactly what my husband tells customers—that *convinces* them.

"He doesn't get called out of bed at all hours because something's gone wrong. He has very little service trouble to worry about. And besides, he's been all through the special technical training provided by G-E. That means installations are right to begin with, and there are few complaints because they *stay right*.

"We live very comfortably

"Of course my husband is in business to make money—and he does. He started in selling G-E Heating and then added Cooling and Commercial Refrigeration. So now he sells the *complete* lines.

"He says they are the most complete lines in the business. No matter what prospects want he usually can supply them. Not only that, he has cut out what they call seasonal slumps, so that when one line is off *two others* keep him busy and keep sales up.

"And with G-E he carries what he calls a skeleton line. This keeps the inventory costs down because he can get whatever he needs in a hurry, from his distributor.

"This gives you some idea what it means to be a G-E Dealer. And there are lots of other reasons too!"

Heating Cooling Commercial Refrigeration

Year 'round prospects—year 'round profits

Three lines—three opportunities for profits. You can be a G-E Dealer if you can fill certain requirements. For year 'round profits, fill in and mail the coupon today.

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY
Div. 199-1053, Bloomfield, N. J.
I want all details on the G-E Dealership for my territory.

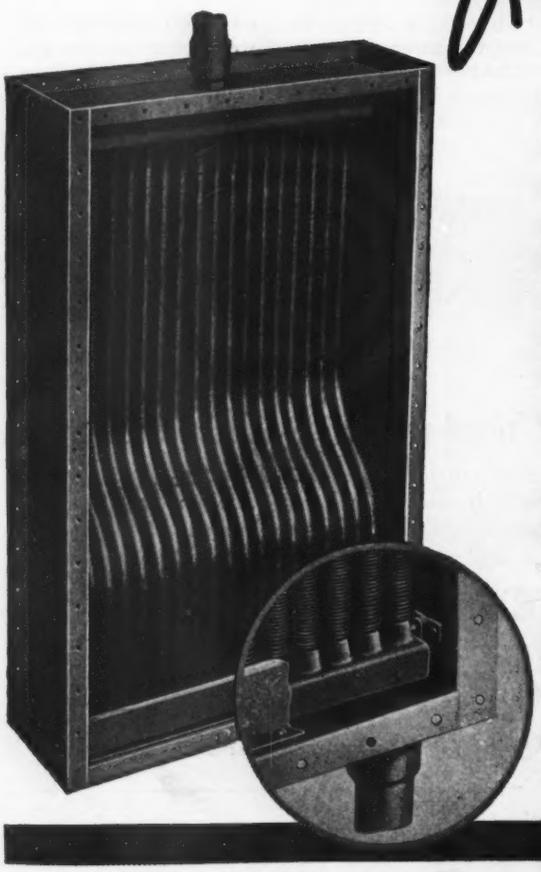
*Name*_____

*Street*_____

*City*_____ *State*_____

AEROFIN

Like an accordion



Well, not *just* like it, but *Flexitube* Aerofin does eliminate strain transmission to headers and joints by permitting independent expansion and contraction of each tube. This flexibility prevents costly heating shut-downs. Sudden fluctuations in heating requirements are scientifically accommodated — there's no chance for injury to Aerofin.

When your heating specifications call for tubing "that can take it," call for Flexitube Aerofin.

AEROFIN CORPORATION

410 S. GEDDES ST., SYRACUSE, N. Y.

CHICAGO • DETROIT • NEW YORK • PHILADELPHIA
DALLAS • CLEVELAND • TORONTO

QUICK DELIVERY—

● When you sell Sunbeam Warm Air Furnaces, you're sure of prompt, quick delivery—so vital in concluding any sale. In the warehouses shown below there are ample stocks of these fine, fast selling units. So today—right now—write for the name of the Sunbeam Jobber nearest you. Then all you need do is to pick up your phone to place your order. Remember this too: There are Sunbeam Warm Air Furnaces to meet every need in any home —for Oil, Gas or Coal—automatic or hand-fired.

ALABAMA
Birmingham
Mobile
Montgomery
Tuscaloosa

ARKANSAS
Little Rock

ARIZONA
Phoenix

CALIFORNIA
Sacramento
San Francisco

COLORADO
Denver
Grand Junction
Pueblo

CONNECTICUT
Bridgeport
Danbury
Hartford
New Britain
New Haven

DELAWARE
Wilmington

DISTRICT OF COLUMBIA
Washington

FLORIDA
Jacksonville
Miami

GEORGIA
Atlanta
Columbus

IDAHO
Nampa
Weiser

ILLINOIS
Belleville
Champaign
Chicago
Christopher
Danville
East St. Louis
Elgin
Joliet
Peoria
Quincy
Rockford
Rock Island
Springfield

INDIANA
Evansville
Fort Wayne
Indianapolis
Muncie
South Bend

IOWA
Des Moines
Dubuque
Ottumwa
Sioux City

KANSAS
Salina
Wichita

KENTUCKY
Bowling Green
Hopkinsville
Lexington
Louisville
Owensboro
Paducah

LOUISIANA
New Orleans

MAINE
Bangor
Lewiston
Portland

MARYLAND
Baltimore
Cumberland
Hagerstown

MASSACHUSETTS
Boston
Brockton
New Bedford
Pittsfield
Springfield
Worcester

MICHIGAN
Detroit
Flint
Grand Rapids
Jackson
Lansing
Pontiac
Port Huron
Saginaw

MINNESOTA
Duluth
Minneapolis
St. Paul

MISSOURI
Kansas City
Jefferson City
Joplin
St. Louis
Springfield

MONTANA
Butte

NEBRASKA
Omaha

NEW JERSEY
Asbury Park
Camden
Newark
New Brunswick

NEW YORK
Albany
Auburn
Binghamton
Brooklyn
Buffalo
Elmira
Glens Falls
Middletown
New York
Poughkeepsie
Rochester
Syracuse
Utica
Watertown
White Plains

NORTH CAROLINA
Asheville
Charlotte
High Point
Raleigh
Winston-Salem

NORTH DAKOTA
Fargo

OHIO
Akron
Ashtabula
Canton
Cincinnati
Cleveland
Columbus
Dayton
Mansfield
Newark
Portsmouth
Springfield
Toledo
Youngstown
Zanesville

OKLAHOMA
Oklahoma City
Tulsa

OREGON
Portland

PENNSYLVANIA
Altoona
Bethlehem
Erie
Lewistown
Philadelphia
Pittsburgh
Pottsville
Reading
Scranton
Sunbury
Wilkes-Barre
York

RHODE ISLAND
Providence

SOUTH CAROLINA
Columbia

SOUTH DAKOTA
Sioux Falls

TENNESSEE
Chattanooga
Jackson
Johnson City
Knoxville
Memphis
Nashville

TEXAS
Dallas
San Antonio

UTAH
Salt Lake City

VERMONT
Rutland
St. Johnsbury

VIRGINIA
Danville
Richmond
Roanoke
Rosslyn
Staunton

WASHINGTON
Seattle
Spokane
Yakima

WEST VIRGINIA
Charleston
Huntington
Parkersburg
Wheeling

WISCONSIN
La Crosse
Milwaukee

THERE ARE STOCKS OF
SUNBEAM
WARM AIR FURNACES
IN WAREHOUSES EVERYWHERE
ready for prompt delivery!

AMERICAN
HEATING EQUIPMENT
COSTS NO MORE THAN OTHERS

AMERICAN RADIATOR & Standard Sanitary
New York CORPORATION Pittsburgh

Copyright 1940, American Radiator & Standard Sanitary Corporation

SUNBEAM
WARM AIR FURNACES AND
AIR CONDITIONING UNITS

DEFEND OUR COUNTRY
ENLIST NOW IN THE
U. S. ARMY OR NAVY

"MY GROSS SALES VOLUME INCREASED TENFOLD SINCE I STARTED WITH *Enduro Stainless Steel*"

Years ago this man was a tinner. Today he is a businessman. What he has done, you, too, can do. Read, in his own words, the experience of M. J. (Mike) Cutter, Cutter Sheet Metal Manufacturing Company, St. Clair Ave., Cleveland, O., showing how he built a profitable business.

● "I started in business as a tinner in 1921 and struggled with run-of-mine jobs for several years. Then I decided to do something about the 'I eat you and you eat me competition.' In 1928 I found the answer—ENDURO* Stainless Steel.

"There was a very good reason for my move. Everyone told me that the metal was good, but too tough to work. That challenged me.

"I found that there are two requisites to the successful fabrication of stainless steel—proper shop equipment and the application of common sense. If a man can form ordinary sheet metal and has a head that he uses, he can form stainless steel. And that's no Pollyanna advice. I proved to my own satisfaction that the phrase 'Too hard to work' is all bosh.

"And believe me, my decision to jump into stainless steel work was a most profitable one. My gross volume in the last eleven years has increased ten times, and stainless represents 75% of my business. Since 1921 my average working force has jumped from one to twenty-five workers.

"When I tell you that my specialty is restaurant equipment, you will understand why I like ENDURO Stainless Steel, because in this work appearance is of prime importance, and the beauty that ENDURO brings to any job is a big help in selling it.

"Today there are greater opportunities in stainless steel than ever before. I would advise any tinner who is interested in cracking this business to concentrate on industrial plants in his territory. There are many common sheet metal applications in plants, such as drip pans, hoods, etc., that represent profitable work.

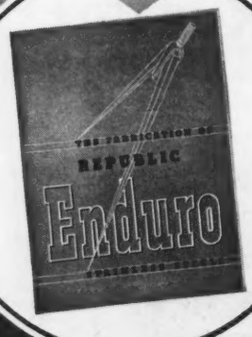
"And here is another tip to paste inside your hat. It won't be very long before stainless steel gutters and spouts will be a common sight.

"So my suggestion to any sheet metal contractor who wants to make his business more profitable is to go hide in a corner for a couple of days and study the market for stainless steel. Then beat the bushes and inform the world that you specialize in the fabrication of stainless steel. Pretty soon you'll discover, as I did, that the world will reverse the procedure of your beating the bushes and will start coming to you. And when your customers start complimenting you on your work, you will begin to appreciate what a really wonderful metal ENDURO Stainless Steel is. The best insurance of my business is to hear a customer say, 'Mike, that's a swell job.'"

*Reg. U. S. Pat. Off.

● From this office "Mike" Cutter sells thousands and thousands of dollars worth of fabricated stainless steel year after year. His men have become so adept at handling ENDURO Stainless Steel that it moves through the shop today with no more difficulty than if he were working with ordinary galvanized sheets. If you would like to know some of the little things that he has learned about the fabrication of stainless steel—

send for this book, it will help you make more money



REPUBLIC STEEL
REG. U. S. PAT. OFF.

BERGER MANUFACTURING DIVISION
NILES STEEL PRODUCTS DIVISION
STEEL AND TUBES DIVISION
UNION DRAWN STEEL DIVISION
TRUSCON STEEL COMPANY

REPUBLIC STEEL CORPORATION, *Cleveland, Ohio*

Please send me without charge a copy of "The Fabrication of ENDURO Stainless Steel."

Name.....

Company.....

Street..... *City*.....

Vol. 109 American Artisan No. 10

Your Industry Needs Your Help

RESPONSIBLE sources of information in Washington report that certain Congressmen and Senators are bringing pressure to bear on all the agencies responsible for the purchase of heating equipment to convince these departments that the warm air heating industry cannot produce the units required for the rearmament program and that, therefore, every heating specification should be thrown open for a radiator heating alternate.

The facts are, so far as any survey of production we can make indicates, that the warm air furnace manufacturers are amply able to produce any and all types of equipment called for—and within the time schedules set—if only the requirements are definitely scheduled and completely and finally specified.

Every man in the warm air heating industry can assist his industry if he will get in touch with his Congressman or Senator and tell them that these rumors are without foundation and can be proved so if a checkup is made. Tell them, also, that this industry has a national association which can quickly verify any delay in production and point out manufacturers able to pick up any lagging schedules.

This rearmament program heating potential is well worth fighting for. If readers have followed Mr. Kruckman's letters from Washington and will also read this month's letter, it should be easy to grasp the widespread scope and tremendous volume included in work now under way, ready for construction and yet to come. As this month's Washington Letter indicates, the buildings to be heated are of every type, of infinite variety in size and heating requirement and seem to be located in almost every state and most well known communities. If, as all reports indicate, these listed awards or projects are only the beginning of the program, this industry cannot afford to let any competition upset our apple cart.

We can see, reading between the lines, that enormous as the listed construction program is, the program outlined is only the skeleton of the potential our industry can expect. As Mr. Kruckman points out, many of these camps, materials plants and equipment producers are being located in communities where there just aren't houses enough for the workers. Thousands of homes, apartments and housing units are going to be needed. In many cases completely new towns must be built.

As far ahead as we can see, construction of all kinds will reach tremendous volumes and the warm air heating industry wants its share of installations. If we are to lose some business let it be on the basis of merit or preference and not on the basis of "fifth column" propaganda.

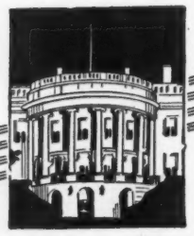
We assume that some of the criticism of this industry's ability to produce stems from the specifications given us by the purchasing departments. Every reader should study the report of the National Warm Air Heating and Air Conditioning Association's recommendations in this issue. As this report clearly indicates, some of the specifications call for gauges of materials, or materials, or methods of application which all our research indicates are absolutely not necessary.

Surely the service required of warm air equipment cannot be so severe that extra heavy casings are needed; that operators need some device to indicate position of grates when nine million owners have successfully closed the grates without such a device; that 14-gauge smoke pipe of special composition and specially treated is essential.

This industry can rightly point out that ours are not new or untried products and installations.

(*Continued on page* 117)

Arnold Kruckman's



Washington Letter

As readers undoubtedly know, housing is an urgently pressing problem of the suddenly mushrooming national defense activities. They tell us here that workmen and others who, with their families, have swiftly converged on the communities in every part of the country for work at factories and plants, are sleeping in garages, in their cars and even in public parks in some Southern and Western towns. There are something under 300 towns and cities where conditions more or less approximate this description. There are other places where towns are just coming into existence and where those who are building them have crowded neighboring communities to the bursting point.

Types of Army Houses

Here in Washington the Army is working with every facility at its command to ameliorate conditions in any way associated with Army work. Together with the Navy, it has obtained from the President's $200,000,000 fund enough ready money to build $50,000,000 worth of dwellings. The plans have been hastily put together under the supervision of L. M. Leisenring, the Army's architectural supervisor. A few buildings are being erected along the usual lines of an Army Post, with masonry exteriors and with hot water heating plants. These homes, intended for civil officials at the new towns, usually cost between $7,500 and $14,500 each. The lowest-cost structure has three bedrooms; it is the type of dwelling usually provided for noncommissioned officers at Army Posts. The other structures, regular officers' homes, cost $12,500 and $14,500, and have from three to four bedrooms.

Most of the single-family homes, in building, are frame-houses. Warm-air heating plants of the simplest types are installed to heat the 5 or 6 room homes. Mr. Leisenring is very frank in saying that most of these socalled temporary structures are relatively very rough. He likens them in general to the temporary wooden barracks erected at the camps scattered around the country for the reception of the National Guardmen and the conscript army. The architect says these barracks may reasonably be compared to a ranch bunkhouse, with trimmings. Incidentally, warm air will be used in all these barracks and in other general buildings at these camps.

Warm Air Geographically Sized

The installation of these warm air heating plants has been planned with a 5% differential for heating capacity in three separate zones. The South, and some parts of the extreme West, is placed in a zone designated as zero-plus-20. This installation, obviously, will be different than the installation in the zone of intermediate or temperate climate States, which is labelled zero-flat. In the Northern States the zone is specified as zero-minus-20 and the heating plant and duct work is planned to distribute more heat, generated in a larger furnace. Some one has said here that the soldiers in some of the Northern camps may be chilly at times, but that they can easily get exercise by shoveling on more coal.

The Navy also is building similar structures at a few points. The Navy operations, under the general supervision of the Bureau of Yards and Docks, have been planned by C. F. Palmer, one of the major assistants in the construction section of the National Defense Advisory Commission. Inquiries about the details of the Navy housing are referred to Mr. Palmer.

Some Building to Other Agencies

The Navy program is, of course, insignificant beside the huge job that confronts the Army. Victually 90% of the defense plants and factories, in addition to the great chain of training camps, come under the supervision of the Army. The Army assumes responsibility for all jobs that are clearly military, but shunts others to such civil agencies as may be prepared to take charge. This is the reason the USHA is financing the dwellings that are rising or are planned at many places. It has advanced $24,144,000 up to September 15, for 21 projects in 17 localities. The USHA loans the funds or the credits to the local Housing Authorities where the dwellings are to be built.

All Types of Heating

In some places the structures are single family homes, in others there are one-story duplex structures, and in others they build what they call one-story twins. Most of these dwellings have been built or planned in Hartford, Conn., in Rock Island, Ill., Moline, Ill., Norfolk, Va., Portsmouth, Va., Charleston, S. C., Newport News, Va., Rantoul, Ill., and elsewhere. The average cost is $3,000 per 5-room dwelling. In Moline they are using coal fired gravity hot water heating; in Portsmouth, Va., individual circulating heaters; in Charleston, S. C., individual space heaters; in Newport News, individual gravity hot water heaters. In many places they suggest warm air furnaces. Each operation is under the local supervision of the community Housing Authority. The local organization formulates the specifications and makes the contracts. The details about the jobs in prospect may be obtained at the local Housing Authority. A list of the communities, where housing either is in process of building or where it is planned, appears at the end of this letter.

Rivalry Between Agencies

It should be remembered that by far the greatest proportion of the housing is as yet in the most nebulous stage of preparation. Washington is in the throes of another hectic War boom and the confused muddle reminds you of the days of 1917 and 1918. The pressure for action is so insistent that specifications for many building operations are based upon the most sketchy plans. In effect Washington at this time gives the contractor a broad concept of the general idea and sends along the details as fast as they are produced in the technical sections. The chief job is practically centered upon the contractor and the Army or Navy inspector at the point where the building is rising. Acquaintance with the men on the job is obviously desirable. Decision about many important details must rest with them.

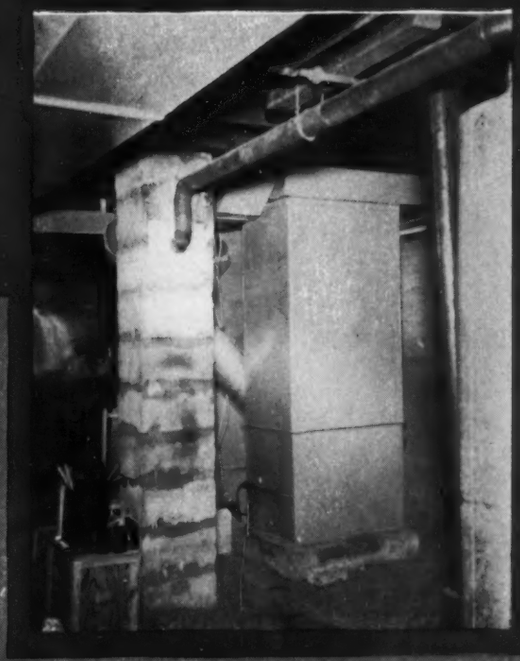
Of course, much of the housing cannot actually be started until more money is available. Most of the Army and Navy fund has been spent or allocated. The bill now in process of debate in Congress provides another $150,000,000 to be spent upon dwellings to cost not more than an average of $3,000. The debate is chiefly about who shall be made responsible for the spending. There is another bill which would give $125,000,000 additional to the USHA. But this bill apparently has little chance of enactment.

The debate over the first bill centers

(*Continued on page* 112)

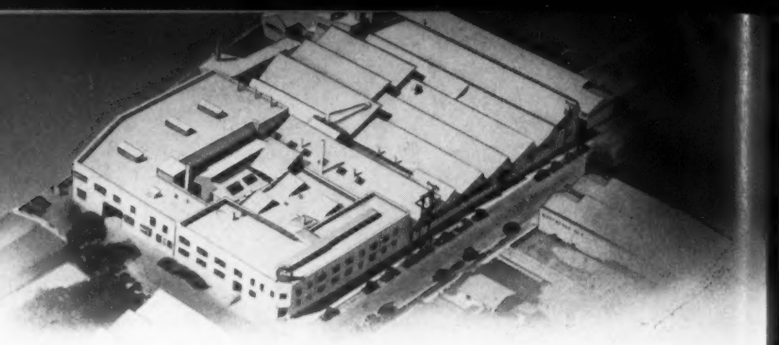
AMERICAN ARTISAN

RESIDENTIAL AIR CONDITIONING SECTION



DEVOTED TO HOME AND SMALL COMMERCIAL AIR CONDITIONING

Pacific



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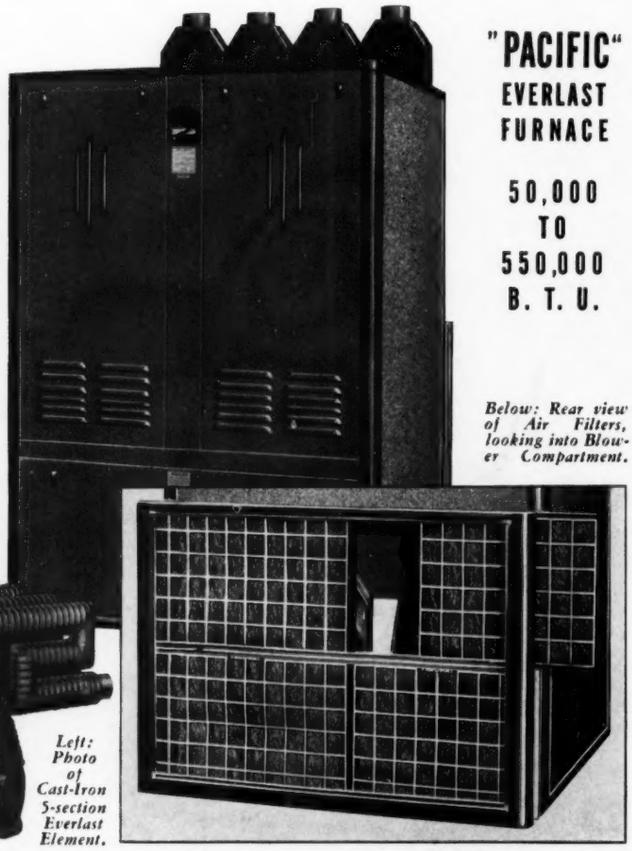
HUNTINGTON PARK, CALIF., AUGUST, 1940

LIKE AN AIRPLANE ENGINE

Cast-Iron Heating Element Finned and Streamlined for Faster, Better Radiation

Sectional, Self-Contained Heating Elements Provide a Very Flexible Range of Capacities

Where heavy duty operation, durability, safety and efficiency are required, specify "Pacific" Everlast Furnaces, gravity or blower type. *The time-tested cast-iron heating element is different. It provides frictionless warm air passages for unrestricted air flow and rapid heat transfer through the finned radiation surface. A wide selection of heating capacities (50,000 B.T.U. to 550,000) are obtained by using sectional construction. Each section has its own heating element, individual venturi-type burner and draft diverter. All joints are machine surfaced so that, when bolted together with heavy asbestos gaskets, they form an integral, gas-tight, leak-proof unit of great strength and durability. Openings between each section give the effect of a continuous combustion chamber. Burners are supplied for either natural or manufactured gas. A wide range of automatic Controls, as approved by the American Gas Association, can be furnished. *Write today for full information on the profitable "Pacific" Everlast Furnaces.

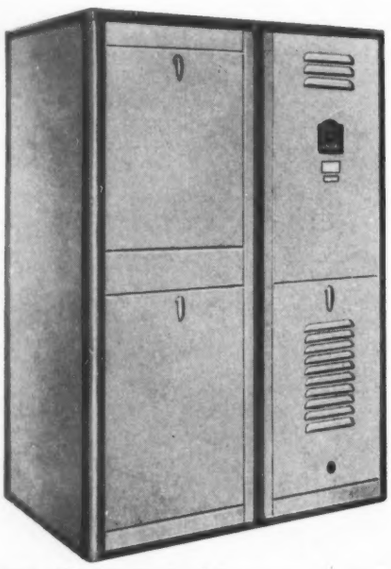


Left: Photo of Cast-Iron 5-section Everlast Element.

"PACIFIC" EVERLAST FURNACE

50,000 TO 550,000 B. T. U.

Below: Rear view of Air Filters, looking into Blower Compartment.

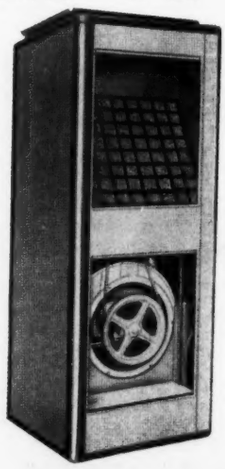


Sell Comfort de Luxe....Winter Air-Conditioning And Summer Ventilating with "Pacific" A-69

HERE'S a big seller ! A winter air-conditioning and summer ventilating unit of utmost efficiency, with a modern case of handsome appearance that invites people to spend a few more dollars for a furnace around which they can remodel their basements into attractive and useful extra rooms. Many new homes are planned with basement playrooms because this beautiful and compact gas furnace is available. *The "Pacific" A-69 is made in a wide range of capacities to care for most heating and ventilating requirements. The Multi-Tubular Burner assures complete combustion of natural, manufactured or liquefied petroleum gases. It has the *"Pacific"* Round All-Steel Heating Element. The Blower is provided with grease-packed self-aligning ball bearings mounted in rubber pillow-blocks, assuring thorough lubrication and quiet operation. *Write us for all details on this fast-selling forced-air furnace . . . *"Pacific" Model A-69.*

Right: Blower section of the A-69, panel removed to show Blower and one of Air Filters.

Below: Multi-Tubular Burner and Cast-Iron Liner.



PACIFIC GAS RADIATOR CO.

MAIN OFFICE AND FACTORY HUNTINGTON PARK, CALIF.

Simplified Design Method for Fan-Furnace Systems

By W. W. Howe
Sausalito, California

THE constantly increasing popularity of the winter air conditioning system has created a demand for simpler methods of design. Any method acceptable to the furnace contractor or sheet metal shop should be one that requires a minimum of time and effort. The following simplified method is dedicated to the busy sheet metal contractor with the hope that he will find it a time saver. This method has been used for the design of several hundreds of installations which have actually been installed and are in operation. It has been used for both small and large residences and for a number of commercial buildings of considerable size. No difficulty was experienced with any of them. The experience, however, has been entirely for California climate with an outside design temperature of 30 degrees above zero. I see no reason why it should not be just as successful for more severe climates if the heat losses are figured correctly.

Step No. 1. Secure a supply of figuring paper having 10 vertical columns. You will need the blue prints of the building or if there are no blue prints available, you will have to make a pencil sketch of the floor plans of the building. Make this to ⅛ inch scale. Use transparent drawing paper with a sheet for each floor and a sheet for the basement if the ducts are to be in the basement or a sheet for the attic, if the ducts are to be in the attic.

Step No. 2. Head the columns of your figuring sheet (see sample sheet) as follows:

Col. No. 1 Name of room
Col. No. 2 Heat loss
Col. No. 3 Distance (bonnet to register)
Col. No. 4 Temperature drop (½ deg. per foot)
Col. No. 5 Register temperature (actual)
Col. No. 6 Factor (Table 3, Col. 2)
Col. No. 7 C. F. M.
Col. No. 8 Register size
Col. No. 9 Pipe size
Col. No. 10 Return Air Grille

Under Column No. 1 set down the various rooms, living room, dining room, etc. List all halls, dressing rooms, etc., whether they are to have a warm air register or not.

Under Column No. 2, set down the heat loss of each room. The heat loss is to be figured according to your regular method and for the design temperatures used in your locality. Heat loss calculations should be carried on a separate figuring sheet and the final result for each room used under Column No. 2. Next locate the registers on the plan. Sketch in the duct system, connecting the registers to the bonnet of the furnace (see sample duct system).

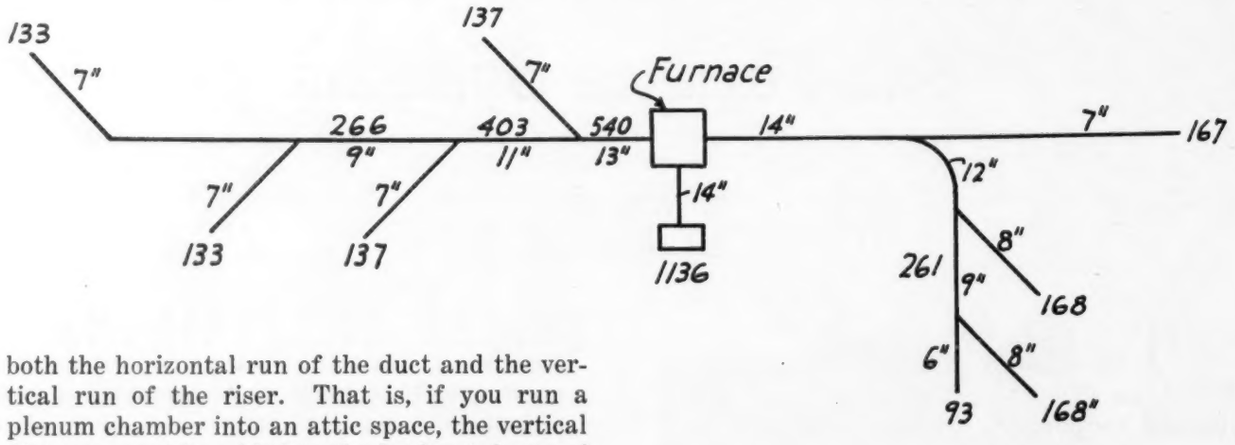
Under Column No. 3, set down the distances between the registers and the furnace bonnet. This figure will be in feet and should include

SAMPLE FIGURING SHEET

Job..... Address..... Date.....

Room	Heat Loss	Distance	Temp. Drop	Reg. Temp.	F. Factor	C.F.M.	C.F.M.	Register	Pipe	Return Air
Living...	20,000	10 ft.	5	145°	75	266	266	2–12x5	7	8x24
Dining...	15,000	16 ft.	8	142°	73	205	274	2–10x5	7	with
Recpt....	5,000	16 ft.	8	142°	73	69	—	—	—	14″
Kitchen..	8,000	18 ft.	9	141°	72	111	167	14x5	7	pipe
Brk.....	4,000	18 ft.	9	141°	72	56	—	—	—	
Hall.....	3,000	20 ft.	10	140°	71	42	—	—	—	
Bed. No. 1	10,000	30 ft.	15	135°	68	147	168	14x5	8	
Bed. No. 2	10,000	30 ft.	15	135°	68	147	168	14x5	8	
Bath.....	5,000	40 ft.	20	120°	54	93	93	8x6	6	
	80,000					1,136	1,136			

Gas furnace, California—1136 × 106 = 120,000 all air recirculated.



both the horizontal run of the duct and the vertical run of the riser. That is, if you run a plenum chamber into an attic space, the vertical distance must be added to the horizontal run of the duct after it reaches the attic. The vertical run from the duct in the basement to the register should also be added to the horizontal run.

Under Column No. 4, set down the estimated drop in temperature of register air. Suppose we have a furnace bonnet temperature of 150 degrees. A register 50 ft. from the bonnet will deliver air to the room at a temperature lower than 150 degrees. The drop between the bonnet temperature and the register temperatures will depend largely upon the thickness and efficiency of the duct covering, the temperature of the air surrounding the ducts and the velocity of the air passing through the duct. A figure of ½ degree for 1 ft. of distance between bonnet and register will be safe. After you have a few jobs working, use thermometers to check this drop under your own working conditions and use the figures so obtained in future calculations. For the register about 50 ft. from the bonnet, the drop would be 25 degrees and the temperature of the air leaving the register will be 150 degrees less 25 degrees or 125 degrees.

Under Column No. 5, set down the estimated register temperatures obtained as explained above.

"F" Factor = Reg. Temp.—Room Temp.

Under Column No. 6, set down the "F" factor obtained from Table No. 3, Col. 2. The factor for 125 degrees would be 58. It will be understood that the heat capacity of air leaving a register is the capacity of the drop from the register temperature to room temperature or 70 degrees. For our register at 125 degrees, the heat capacity would be proportional to 125 less 70 or 55 degrees. The lower the register temperature, the more air required to deliver the heat for a given room.

Under Column No. 7, set down the C.F.M. or cubic feet air per minute required by each room. This C.F.M. is obtained by dividing the heat loss of the room taken from Col. 2 of your figuring sheet by the "F" factor in Col. 6. Thus, a room with a heat loss of 10,000 B.t.u. per hour and a register temperature of 125 degrees would require 10,000 divided by 58 or 173 C.F.M. Add the C.F.M. of the halls, dressing rooms, etc., which have no register to the nearest room having a register. For example, with a bedroom having a dressing room at one side, you would add the C.F.M. of the dressing room to the C.F.M. of the bedroom. Add the C.F.M. of halls to one or more of the rooms adjoining. For example, if you had a hall requiring 75 C.F.M. with three bedrooms off this hall, add 25 C.F.M. to each of the bedrooms.

Register and Grille Sizes from Tables

Under Column No. 8, set down the correct register size as obtained from:

Table No. 1 for forced air type registers. See bottom of page for velocity.

Table No. 2 for floor or ceiling registers. Use 600 F.P.M. velocity.

Under Column No. 9, set down the correct branch pipe size. These will be found in tables 1 and 2 in the same line as the register selected.

Under Column No. 10, set down the correct size of return air grille which will be found in Table 2, Col. 9, opposite the C.F.M. handled by the grille as shown in Col. 8. For example, the correct grille for 1400 C.F.M. would be 8 x 30 or 10 x 24 with a 16" duct. Use 1000 F.P.M. velocity.

One return air grille will be ample for the average 6 room or less house. Where two or more return air grilles seem to be required, select the grille proportionate to the C.F.M. handled by each grille. It is somewhat difficult to so adjust the friction loss in return air grilles so that the required flow will be obtained when

TABLE NO. 1—CAPACITY IN C.F.M. FOR FORCED AIR REGISTERS

Register	Smallest Area of Reg. Pipe S.H.	Stack Head	Round Pipe Connection	Rectangular Pipe Connection	Delivery in C.F.M. at Velocity	
					600 F.P.M.	800 F.P.M.
No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7
	(Sq. In.)		(Dia.)			
6x4	12.6	3x6	4"	6x3	50	70
8x4	18	3x8	5	8x3	75	100
8x6	23	3x8	6	8x4	95	125
8x6	25.5	3½x8	6	8x4	105	140
8x6	28.3	4x8	6	8x4	115	160
10x4	23	3x10	6	10x3½	95	125
10x5	26.5	3x10	6	10x3½	110	150
10x5	31	3½x10	7	10x4	130	175
10x6	37.5	4x10	7	10x4	155	210
12x4	28	3x12	6	12x3	115	155
12x5	32.2	3x12	7	12x4	135	180
12x6	37.5	3½x12	7	12x4	155	210
12x8	45.3	4x12	8	12x5	190	255
14x4	34	3x14	7	14x3½	140	190
14x5	37.5	3x14	7	14x3½	155	210
14x5	43.2	3½x14	8	14x4	180	240
14x6	50.3	4x14	8	14x4	210	280
30x4	63	2- 3x14 or 3x30	9	30x3	265	350
30x5	69	2- 3x14 or 3x30	9	30x3	290	385
30x5	78.5	2-3½x14 or3½x30	10	30x4	330	440
30x6	85	2-3½x14 or3½x30	11	30x4	360	475
30x8	99	2- 4x14 or 4x30	12	30x5	415	550

Use 600 F.P.M. velocity for side wall registers above baseboard and 800 F.P.M. velocity for side wall registers just under ceiling.

---

two or more grilles are used. The tendency is for most of the air to flow into the grille closest to the furnace. Return air grille should be located in a central hall with as short a run to the furnace as possible. Return air grille must be located at the lowest level of the space to

---

TABLE NO. 2—OLD STYLE FLOOR OR CEILING REGISTERS AND RETURN AIR GIRLLES

Dia. Round Pipe	Area	Rectangular Pipe	Old Style Registers in Floor or Ceiling	Capacity in C.F.M. at Velocity F.P.M.				Return Air Grilles	
				400	600	800	1000		
No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	
4"	12.6	6x3	6x6	35	55	70			
5"	19.6	6x3½	6x6	55	80	110			
6"	28.3	6x5	6x8	70	105	145			
7"	38.5	8x5	8x10	100	150	200			
8"	50.3	8x6	8x10	125	185	250	315	6x14	
9"	63.6	8x8	8x12	160	240	320			
10"	78.5	10x8	10x12	200	300	400	520	8x12	10x10
11"	95.0	12x8	12x12	265	395	530			
12"	113.1	12x10	12x14	285	430	570	720	6x24	10x14
13"	132.7	14x10	14x16	355	525	700			
14"	153.9	14x11	14x16	425	640	850	1050	8x24	
16"	201.1	30x8					1400	8x30	10x24
18"	254.5	30x9					1700	10x30	
20"	314.2	40x9					2150	10x40	16x24
22"	380.1	30x14					2600	16x30	20x24
24"	452.4	36x13					3100	16x36	18x30
26"	530.9	36x15					3650	18x36	22x30
28"	615.8	36x18					4250	24x36	
30"	706.9	36x20					4900	24x36	

be served. For example, if you have a living room which is a foot lower than any other room in the house, the return air grille must be in the living room. Return air grilles in the side wall just above the floor line make a better looking job than grilles in the floor. No room of ordinary construction is air tight. Air forced into a room through the warm air register will find its way to the return air grille by flowing under the door and through the cracks around the door.

Step No. 3. To get the furnace capacity.

Case No. 1. When all of the air handled is recirculated.

Multiply the total C.F.M. of the registers as shown by your figuring sheet by the factor below:

Gas-fired furnace	106
Oil-fired furnace	122
Stoker-fired furnace	132
Hand fired coal	144

For example, if you have a total of 1,000 C.F.M. and are going to use a gas furnace, the input catalog rating should be 106,000 B.t.u. per hour or the closest commercial size above this figure.

Case No. 2. When some of the air is recirculated and some is taken from outdoors.

Multiply the C.F.M. taken from outdoors by the following factor:

	Outside 30 Deg.	Outside Zero	Outside 15 Below
Gas-fired	149	186	205
Oil-fired	172	216	237
Stoker-fired	187	233	257
Hand fired coal	202	254	280

Multiply the C.F.M. recirculated by the factor from Case No. 1. Add the total to get the furnace capacity.

Example: Total 1000 C.F.M.
20% from outside or 200 C.F.M. × 149 = 29,800 B.t.u. per hr.
80% recirculated or 800 C.F.M. × 106 = 84,800 B.t.u. per hr.

Furnace capacity, gas fired and 30 degree outside, 114,600 B.t.u. per hr.

Case No. 3. When all of the air is taken from outside. Multiply the C.F.M. by the factors from Case No. 2.

Example: 1000 C.F.M. all taken from outside × 149 = 149,000 B.t.u. per hr. furnace capacity.

Step No. 4.

Duct Design. You have already connected your registers with the bonnet of the furnace by lines showing the ducts to secure the distances

shown in your figuring sheet under distance column.

You have three velocities to consider:

600 F.P.M = Factor .24
800 F.P.M. = Factor .18
1000 F.P.M. = Factor .14

} See footnote on Table 3 for explanation

Note: These factors are shown in Table No. 3, Col. 4 with the corresponding velocity in Col. No. 3.

Example: If we have 200 C.F.M. flowing through a pipe at 600 F.P.M. the area of the pipe should be 200 × .24 or 48 sq. in.

200 C.F.M. at 800 F.P.M. would have a pipe of 200 × .18 or 39 sq. in.

200 C.F.M. at 1000 F.P.M. would have a pipe of 200 × .14 or 28 sq. in.

All there is to sizing the ducts is to multiply the C.F.M. by the factor corresponding to the velocity you are using to get the square inch area of the pipe and use the closest commercial size, not smaller than the estimated square inches of area.

Suppose we have the first two rooms on the end of the duct system. These rooms require 200 C.F.M. and 150 C.F.M. We already have the size of the branch duct from the figuring sheet. We are using we will say, high side wall registers and the register velocity is 800 F.P.M. The size of the main duct at the point where it is serving these two rooms is 200 plus 150 or 350 × .18 equals 63 sq. in. Look at Table No. 2, Col. 2, 63 sq. in. calls for a 9-inch round pipe or an 8 x 8 rectangular pipe.

Now we add the next room with 200 C.F.M. more. The duct size will be 350 plus 200 or 550 × .18 equals 99 sq. in. and the pipe size will be 12 inch diameter which is the closest size above the required figure. The main duct is thus sized right up to the furnace bonnet.

Main ducts should always be sized in this manner for the same velocity figured for the registers. The return air duct would be sized in the same way except that we use the 1000 F.P.M. velocity factor or .14. Thus, if the air to be handled by the return air duct is 1000 C.F.M. 1000 × .14 or 140 sq. in. calling for a 14-inch diameter round pipe or the equivalent rectangular pipe 14 x 11.

This is a simple and practical method of sizing ducts. Volume dampers are usually installed in each branch duct so that the job can be balanced if necessary, but we have found in actual practice that usually not very much balancing is required.

TABLE No. 3—TABLE FOR TEMPERATURES AND FACTORS

Air Temperature at Register No. 1	F (Factor) No. 2	Velocity F.P.M. No. 3	S. (Factor) (Note 1) No. 4	C (Factor) No. 5	Cu. Ft. Air at Lb. at Given Temp. No. 6
(Degrees)					
90	26	200	.72	1.4	13.8
100	36	250	.58	1.7	14.1
110	45	300	.48	2.1	14.4
120	54	350	.41	2.4	14.6
125	58	400	.36	2.8	14.7
130	63	450	.32	3.1	14.8
135	68	500	.29	3.5	15.0
140	71	600	.24	4.2	15.1
145	75	700	.21	4.9	15.2
150	80	800	.18	5.6	15.4
155	83	900	.16	6.8	15.5
160	88	1000	.14	7.0	15.6
165	91	1200	.12	8.4	15.7
170	95	1500	.10	10.8	15.9

Heat loss of room ÷ F = C. F. M. at given register temperature.
C. F. M. × S = Sq. in. duct area required.
Sq. in. duct area × C = C. F. M. at given velocity.

Note 1—The basic area-cfm-velocity formula is

$$area = \frac{144 \times C.F.M.}{velocity}, \text{ or } area = \frac{144 \times 200}{600}$$

Simplifying, constants $144 \div 600 = .24$
Therefore area $= .24 \times 200 = 48$

Notes:

If the furnace capacity and the fan capacity are ample for the job errors in duct design can easily be taken care of 99 times out of a hundred by merely adjusting the branch dampers. If the furnace is insufficient in capacity or the fan will not deliver the air required, the best duct system in the world will not give you a satisfactory installation.

Fans should not be operated at speeds much over 400 R.P.M. You are liable to get objectionable noise and vibration.

Motors should be sized to handle the load easily and without heating up. Capacitor type motors with a safety switch which will shut down the motor in case of overheating are very satisfactory. Cheap motors usually pull a very heavy starting current and will cause the lights in the house to flicker.

No registers of the forced air type using a stackhead 3½" deep should be over 6 inches high. If the register is higher than this, the air will be delivered through the top 5 inches of the register only. No harm here except the waste of space and the extra cost of the useless part of the register.

Attic duct systems with high side wall registers require cutting of the plates. The two studs between which the register is located should be tied together with an iron strap about 2 inches wide, nailed to each stud.

(*Continued on page* 118)

Condensation Problems in Modern Buildings*

By L. V. Teesdale

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Forest Products Laboratory, Madison, Wisc.

THE conditions under which condensation might develop within walls or in attics of buildings and methods of protection or prevention should be understood by anyone interested in winter air conditioning, particularly for buildings north of the Ohio River. The condensation problem is not new, having always been rather common in barns during severe winter weather, but only in recent years has it become a general problem in houses. Water stains on walls and ceilings are the common signs of this condensation but often the damage is more serious. Stain and decay in sheathing, studs, and roof members, loosened plaster, outside paint failures on siding, door and window trim, and efflorescence on brick and stone are frequently the result of this condensation.

Why Condensation in Modern Houses?

The question naturally arises as to why condensation should be more of a problem today than it used to be. Strange as it may seem, the cause is found in certain improvements intended to increase the comfort of the occupants and decrease operating expenses. Such improvements include thermal insulation, weather strips, storm sash, calking around windows and doors, and other means of decreasing heat loss and wind infiltration. Because of the tighter building construction the normal relative humidity within a house so constructed will be higher than in houses less tightly constructed. In addition, as a health and comfort measure, modern homes are usually provided with some means of increasing the normal humidity either through the heating system or by some auxiliary method. These worthy improvements in construction and equipment that increase comfort and health and decrease operating expenses are the factors mainly responsible for the increase in the condensation problem. To enjoy the advantages of such improvements without suffering the disadvantages certain protective measures should be provided.

Most of the trouble occurs in homes where the relative humidity is maintained at over 40 per cent, in which case there may be evidence of condensation after every cold snap. On the other hand, many homes only show evidence of condensation during or after periods of excessively low temperatures, such as occur once in three or four years.

At low temperature, for example, outdoor conditions at zero, air will hold very little water vapor and the vapor pressure is low. Water vapor is added to the atmosphere within a home from many sources, such as cooking, laundry work, bathing, respiration, and evaporation from plants. The vapor pressure inside a house is consequently greater than that outside.

Further, the normal vapor pressure may be supplemented by evaporating water in a furnace pan, water containers on radiators, or some similar system, thus increasing the vapor pressure. However, there is a constant outleakage of water vapor, the amount depending upon the tightness of windows and doors, the permeability of wall materials, and upon other factors. Our older types of homes usually were so constructed that the vapor was not retained and low humidities prevailed in cold weather. Where the construction is of a type that minimizes infiltration and resists vapor loss the vapor pressure inside will be proportionately higher than in houses less tightly constructed.

Winter air conditioning means, among other things, maintaining a humidity in the home at some established value intended to be better suited to health and comfort than the normal humidity just described. The humidity may be raised automatically with a hygrostat in which case the minimum humidity will be relatively constant.

Inside R. H. Paces Weather

The relative humidity in homes varies widely, depending upon a variety of factors, principally outdoor temperatures. The average humidity for varying outside temperatures as determined from the average moisture content of wood samples is illustrated on Fig. 1. This illustrates how the relative humidity or vapor pressure inside of the house varies more or less directly with the temperature outside. Also that where automatic humidity control capable only of raising the humidity is used the minimum humidity is fixed during cold weather, but humidity may be higher than the minimum during periods when outside temperatures are mild. The amount of water evaporated from furnace pans in very mild weather is small, but as the outdoor

*Paper presented at the Second Conference on Air Conditioning, University of Illinois, March 8 and 9, 1939.

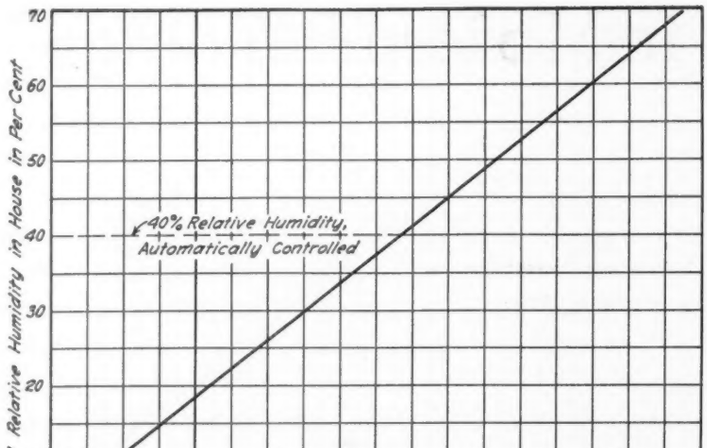

Fig. 1—Relation of normal humidity within a house to outside temperature.

temperature drops the amount increases. For example, in one case only about 1 quart is used per 24 hours when the outdoor temperatures average 45 deg. F. but 2½ gallons are used when outdoor temperatures are about zero. The amount required to maintain a fixed minimum humidity of 40 per cent at zero as illustrated in Fig. 1 would be very much greater.

Phenomenon of Vapor Pressure

To understand the phenomenon of condensation requires a knowledge of the physical laws that apply. A certain amount of water vapor is always present in the atmosphere. The maximum amount of water vapor that can be present depends upon the temperature of the air, being greater at higher temperatures. By definition, air that is completely saturated with water vapor is at its dewpoint temperature, and its relative humidity is 100 per cent. Air not completely saturated with water vapor is above its dewpoint temperature and its relative humidity is less than 100 per cent. Adding water vapor to unsaturated air without changing the temperature of the air will increase the relative humidity and raise the dewpoint temperature. Removing water vapor will have the opposite effects. Raising the temperature of air without changing the amount of water vapor in it will decrease its relative humidity. Lowering the temperature without changing the amount of water vapor will increase the relative humidity till the dewpoint temperature and saturation are reached. Further lowering of the temperature will cause progressive condensation of water vapor from the air.

The use of relative humidity as a measure of the amount of water vapor present in a given atmosphere is not always satisfactory because this relationship varies with the temperature. Hence it is often more practical to use the vapor pressure of the water vapor for this purpose, since it is a direct measure of the amount of vapor present in the air. This property is comonly expressed in terms of inches of mercury or pounds per square inch.

Condensation will take place on a solid surface below the dewpoint temperature as, for example, the glass surface of a window. Condensation can also take place on materials permeable to vapor if the surface be below the dewpoint temperature.

If adjacent surfaces in a comparatively confined space are at different temperatures, all below the dewpoint of the atmosphere in the space, the surface at the lowest temperature may, through condensation, reduce the dewpoint to its own temperature. The temperatures of the other adjacent surfaces will then be above the new dewpoint, and therefore incapable of condensing moisture. Eventually, under these conditions, all of the condensation would be on the coldest surface.

Vapor may pass through a material composed of a single thickness of homogeneous but permeable substance having one surface either above or below the dewpoint temperature of the atmosphere on the warm side and the other at a lower vapor pressure.

The movement of water vapor is largely independent of air movement and no general circulation of air is necessary to carry the vapor from its source to the condensing surface. Vapor actually moves by diffusion from points of high vapor pressure to zones of lower pressures.

Vapor Pressure Determines Penetration

Most building materials, including plaster, wood, concrete, most kinds of brick, and various building papers, are permeable to vapor. The rate of vapor movement from one point to another is more or less proportional to the difference in vapor pressure between the points, and inversely proportional to the resistance of the interposed materials. Walls of conventional house construction are composed of a variety of materials varying in permeability. Also the temperature gradients through a wall drop step by step according to the thermal properties of the material and the difference in temperature between the warm interior and the cold exterior. Should the temperature at any point within the wall, as for example, at the inner face of the sheathing, fall below the dewpoint temperature of the room side of the wall condensation would take place at that point.

A house wall typical of many insulated forms of construction is illustrated in Fig. 2A. This wall has lath and plaster on the inside and sheathing, paper, and bevel siding on the outside. Fill insulation occupies the entire stud space. Indoor conditions are assumed to be: Temperature 70 deg. F. and relative humidity 40 per cent; the dewpoint for these conditions is 44 deg. F. and the water vapor pressure 0.295 in. of mercury. Temperature gradients through the wall are shown in solid black for three outdoor temperatures, namely 20 deg. F., 0 deg. F., and —20 deg. F. Actual gradients in any individual wall of this type may be expected to be

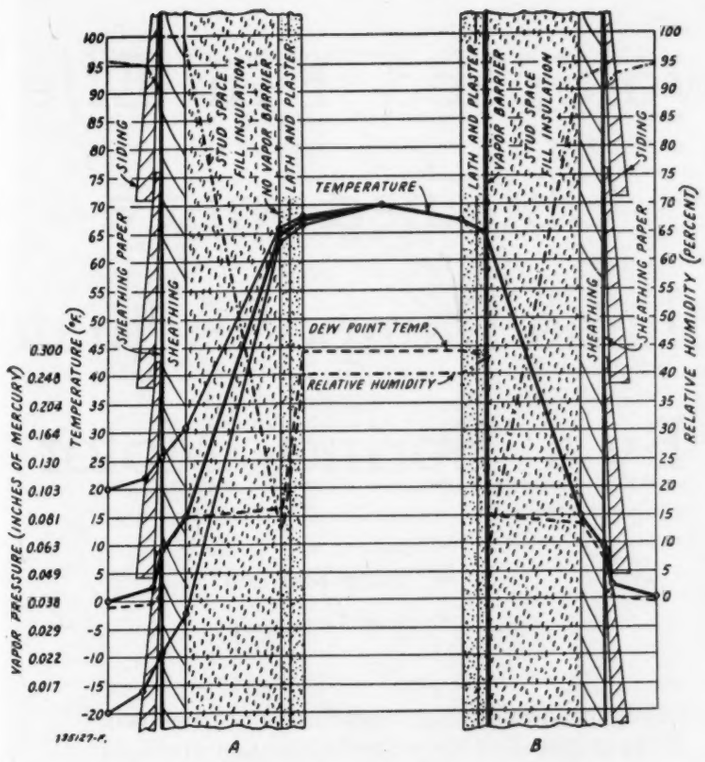

Fig. 2—Section of conventional frame wall with fill insulation, showing temperature, dewpoint, and relative humidity gradients without vapor barrier (a) and with vapor barrier (b).

very similar to these. Much work has been done on this subject by many agencies and the facts are well established. Much less work has been done on vapor movement through walls and associated phenomena and we are much less sure of our ground. However, currently collected data indicate that, under the assumed conditions (outside temperature 0 deg. F.), the temperature of the inner face of the sheathing very largely controls the dewpoint within the entire stud space. It appears that condensation upon this face, which is well below the dewpoint of the atmosphere in the room, serves to lower the dewpoint within the stud space. Just how much lowering takes place we do not know for sure. It seems apparent, however, that at the boundary conditions the dewpoint temperature throughout the stud space would be the temperature of the inner face of the sheathing. The relative humidity gradient corresponding to the illustrated dewpoint gradient is shown as a dot and dash line in the figure.

Maximum Condensation Possible

The amount of condensation that can develop within a wall depends upon the resistance of intervening materials to vapor transfusion, differences in vapor pressure, and time. Ordinary plaster and lath have comparatively low resistance. If the plaster is finished with paint the resistance is increased somewhat. High indoor vapor pressures are associated with high relative humidities and high temperatures. Low outdoor vapor pressures always exist at low temperatures, since even the saturate vapor pressures are low at low temperatures. Weather conditions are not static and the duration of critical conditions varies widely with the time of year and the severity of the weather. During long-continued cold spells, such as the six weeks low temperature period in January and February, 1936, the condensation problem becomes acute, a large number of homes being affected. In the winter of 1937-38 there was only one day at Madison, Wis., when the temperature was below zero, though there were about 90 days in which it averaged below 20 deg. F. Though the number of homes affected by condensation would be less during the mild winter conditions, many cases were reported. Where information was available it appears that the minimum humidities in the affected houses exceeded 35 per cent and generally were higher.

In Fig. 2A we assumed a boundary condition in which the dewpoint temperature in the stud space was absolutely controlled by the temperature of the inner face of the sheathing, and there was a sharp drop in dewpoint temperature through the lath and plaster. The rate of vapor movement and the rate of condensation on the sheathing would be comparatively high on account of the low vapor resistance of lath and plaster. In Fig. 2B we have placed a vapor barrier between the studs and the lath. This barrier greatly reduces the rate of vapor movement through the wall, and thus very materially reduces the possibility of trouble from condensation. What actually happens to the vapor which finds its way

(*Continued on page* 53)

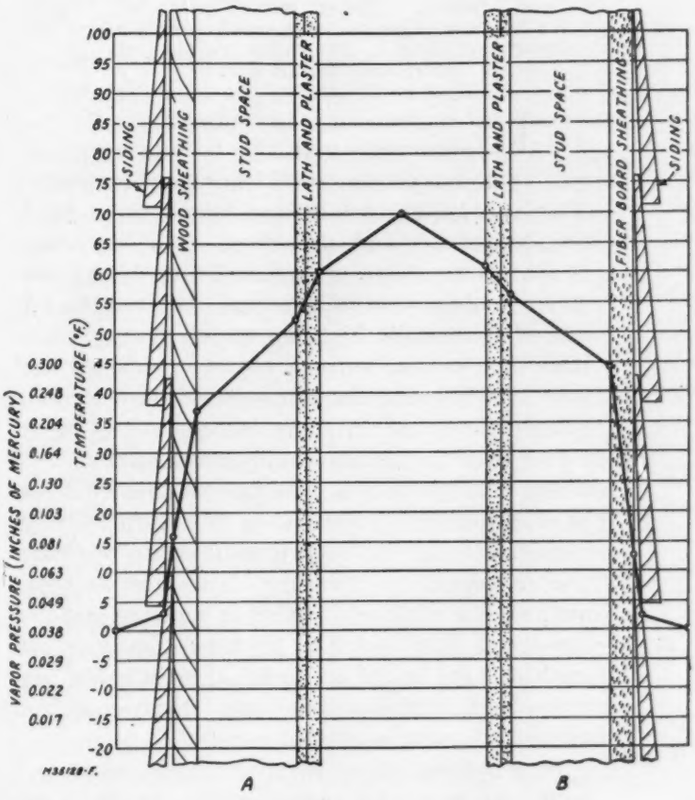

Fig. 3—Section of conventional frame wall, showing temperature gradient with wood sheathing (a) and with ¾-in. Fibre Board Sheathing (b).

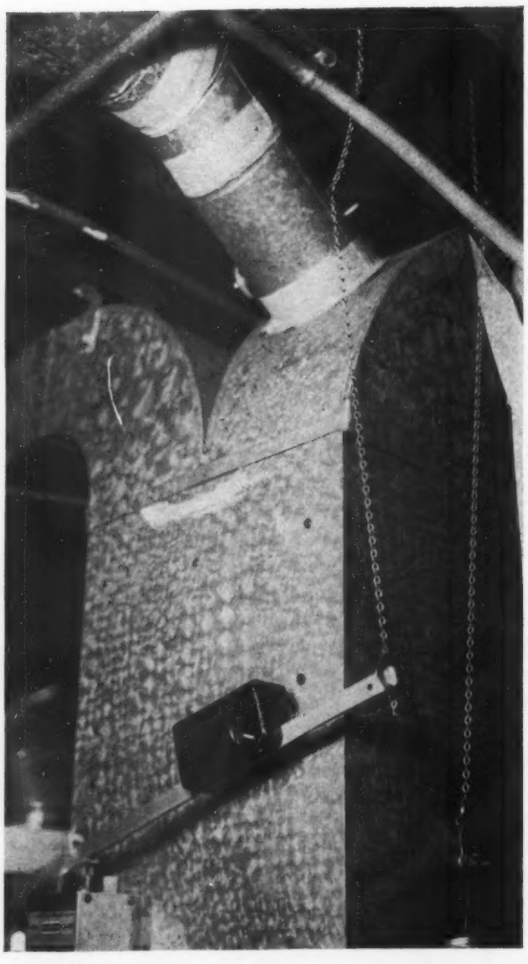

Fig. 5—Test installation reported. Damper in closed position. Spring motor lower left. Weight on arm controls position of damper to temperature changes. The chains provide over-travel limits for the arm.

Two-Speed Fan Effec Obtained with a Volume Damper Actuate By a "Spring" Motor

By W. Bruce Morrison
Portland, Oregon

IN connection with the installation of direct fired, forced air conditioners the contractor often encounters installations which are a headache to installer and customer because the nature of the construction, or susceptibility of the customer to air motion of any kind, required the setting of abnormally high fan switch temperatures. High fan switch settings result in delayed and shorter fan operations causing cold, intermediate temperatures and in some cases overheating of rooms close to the furnace by gravity action.

The correction of a condition of this kind can be accomplished by continuous fan operation with reduction in air delivery proportionate to reduction in bonnet temperature. The most common method of accomplishing this is with the use of a two-speed fan motor. Another less common method is the use of an electrical modulating control. Both of these means cost money and tend to increase service and adjustment.

In searching for an inexpensive means of providing constant fan operation, the use of a mechanical control which has been manufactured for over forty years was suggested. This control has been familiar as a limit control on the draft doors of coal fired hot water boilers and as a bonnet temperature control for hand fired gravity warm air furnaces, to maintain a constant temperature by opening and closing the draft door.

This control can be applied to a forced air furnace, and by proper linkages control a volume damper in the system so as to reduce the air flow with reduction of bonnet temperature. An installation of this kind was made by the writer, and comparative total fan operations were measured under three sets of conditions. The detailed conditions and results of these tests follow.

Effect of Intermittent Fan

The curve shown in Fig. 1 gives the relation of time to temperature and fan operation for a direct fired air conditioner using a twelve-minute firing period. The fan switch settings for the conditioner were the lowest possible for the main-

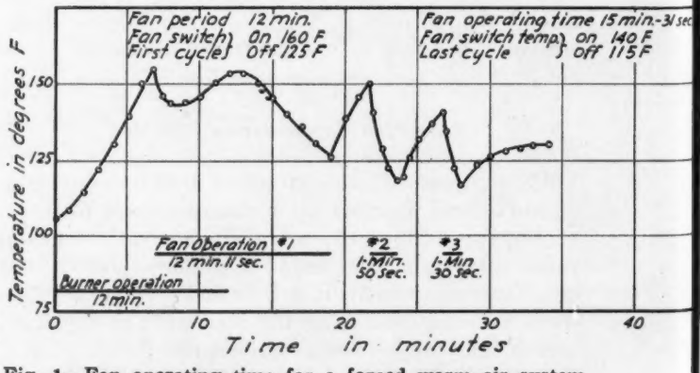

Fig. 1—Fan operating time for a forced warm air system using conventional controls. Fan start and stop set as low as permissible (start 160 deg.—stop 125 deg.) without blowing "too-cold" air.

tenance of comfort conditions for the occupants. A lower fan switch setting proved unsatisfactory to the occupants because the introduction of air at a lower temperature caused noticeable air motion. The total fan operation time under these conditions was fifteen minutes, thirty-one seconds.

The curve shown in Fig. 2 was obtained under conditions identical to that for Fig. 1 except that the damper control was placed in operation and so adjusted as to be open at 160°F. and closed at 110°F. The volume damper was installed with approximately one-half inch clearance on all sides to prevent the possibility of its becoming stuck. With the damper in the full closed position, the air delivery was approximately 50 per cent of that at the full open position. Total fan operation time under these conditions was twenty-four minutes thirty-five seconds, or an increase of 58.4 per cent over Fig. 1.

Effect of Volume Damper

Before obtaining the curve shown in Fig. 3, the fan switch was adjusted to give the occupants as nearly as possible the same comfort conditions as those in Fig. 1. This means that with the damper in full closed position the fan switch was set as low as possible without causing noticeable air motion to the occupants. Under these conditions a

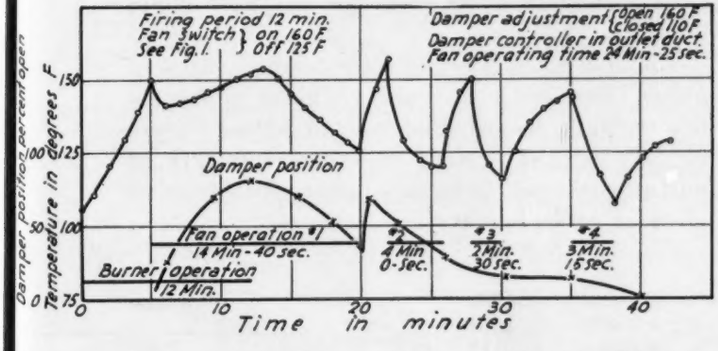

Fig. 2—Same system as Fig. 1 but with volume damper in operation with damper full open at 160 deg. and closed at 110 deg. At full closed, air delivery was approximately 50 per cent of fan capacity. Note longer fan running time.

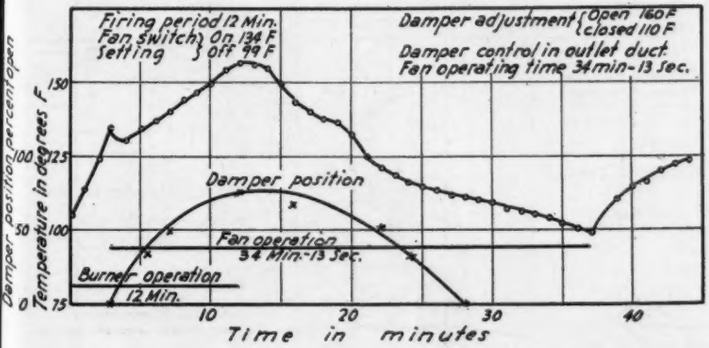
Firing period 12 Min.
Fan switch } on 134 F
Setting } off 99 F
Damper adjustment { open 160 F / closed 110 F
Damper control in outlet duct
Fan operating time 34 min-13 Sec.
Damper position
Fan operation
34 Min-13 Sec.
Burner operation
12 Min.
Damper position, percent open
Temperature in degrees F
Time in minutes

Fig. 3—Fan set to operate as long as possible by setting temperature range at lowest comfort temperatures (on 134 deg., off 99 deg.). Note long fan running time.

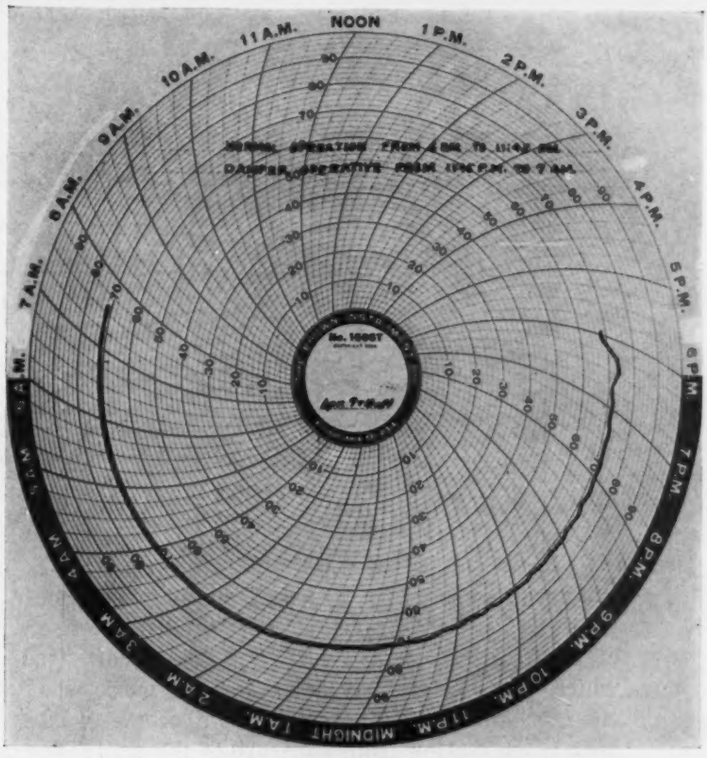

Fig. 4—Room temperatures with and without the damper arrangement. Damper operating midnight to 7 A. M. Damper not operating 7 P. M. to midnight.

total fan operation time of thirty-four minutes thirteen seconds was obtained, or a 120.5 per cent increase over Fig. 1. Another desirable condition obtained was the elimination of fan cycles which are undesirable due to the air in the ducts losing temperature between fan operations and being introduced into the rooms at a temperature low enough to cause objectionable air motion.

A check of room temperature conditions at the control point both with and without the damper are illustrated by the temperature chart in Fig. 4. The chart between the hours of midnight and 7 a.m. is with the damper operative under conditions shown in Fig. 3 with 49°F. average outside temperature. The temperature chart between the hours of 7 p.m. and midnight was made under the conditions as shown in Fig. 1 with 51°F. average outside temperature.

Observations from time to time have indicated that the system with conditions as in Fig. 3, operating with an outside temperature of 48°F. or less, gives continuous fan operation. On this installation the forced air conditioner was adjusted to heat the residence over a 60°F. temperature rise.

A photograph of the damper installation used in obtaining the data is pictured in Fig. 5 with the damper in the closed position. It was found necessary to provide overtravel limits, and on this installation chains attached to the bell crank and fastened to the joists accomplished this purpose. Control of damper position in relation to temperature was varied by positioning the large weight

(*Continued on page* 127)

Air Conditioning for the Relief of Cedar-Pollen Hayfever *[Part5]

By Alvin H. Willis and Howard E. Degler

Research Assistant and Professor of Mechanical Engineering
The University of Texas, Austin, Texas

SEVERAL investigators who conducted tests on the relief of hayfever in the northeastern part of the United States recommended the use of a complete unit room cooler. The theory on which these investigators based their work was the fact that the cooling coils would become moist with condensation from moisture of the air. The pollen in the air would then adhere to the wet coils and thus produce a pollen-free atmosphere in the room.

One of these cooling units was installed in the office of an engineering faculty member at The University of Texas who was allergic to cedar pollen. It was operated so that the room air would be recirculated over the cooling coils. During the cedar pollen hayfever season it was obvious that the patient was more uncomfortable while the unit was operating than when it was not being used. A review of the work of other not being used. A review of the work of other investigators brought out the fact that this experience of discomfort had been revealed previously under entirely different conditions. Nelson, Rappaport, and Welker state in the discussions of their experiments that cooled air with only a little pollen was apparently as effective as warm air with a large quantity of pollen. This is due apparently to a joint irritation by the cool air as well as the pollen. The discrepancy between the views of different investigators as here shown can be explained by the fact that the original reports mentioned were of tests conducted by and for the use of the company that manufactured the equipment.

Development of Fan-Filter-Heater Unit

Another group of investigators recommend a fan and filter unit that mounts in the window of the patient's room. This unit supplies pollen-free air to the room and builds up a slight positive pressure inside. The positive pressure inside causes an outward leakage through the cracks and openings around the windows and doors. The outward leakage prevents inward leakage of pollen-laden air.

The fact that cedar pollen is present in the air during the winter season, when there is a low outside temperature, makes it evident that the window unit just described would not relieve the hayfever patient. The next unit that was considered was a fan and filter unit built to recirculate 100 per cent indoor air. Tests of this unit under actual conditions show that it is not practical for the relief of hayfever because the large air circulation necessary to make it effective causes drafts in the room. These drafts thus created caused the patient to be as uncomfortable as if he had no relief from the hayfever symptoms.

The only other possible arrangement is that of a fan, filter, and heater unit. This is to operate in a partially opened window by bringing in fresh air, filtered and heated. A test of this type of unit proved itself to be satisfactory for the relief of cedar-pollen hayfever.

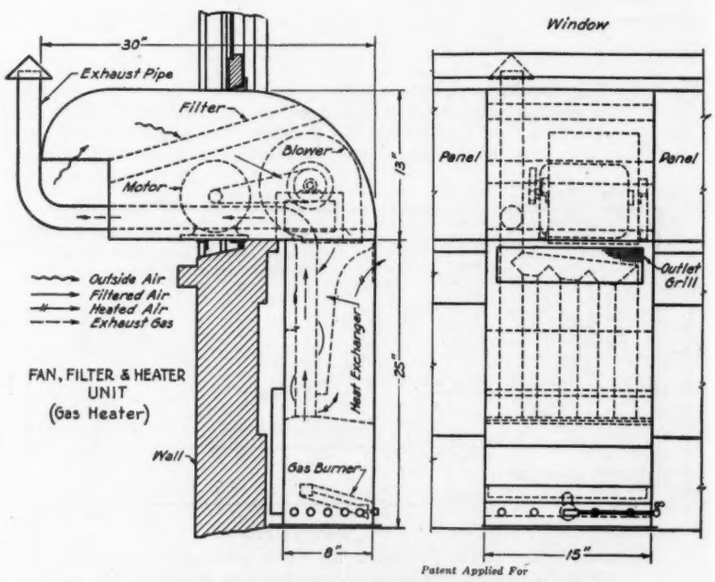

Fig. 19—University of Texas fan-filter-heater air conditioning unit with gas burner.

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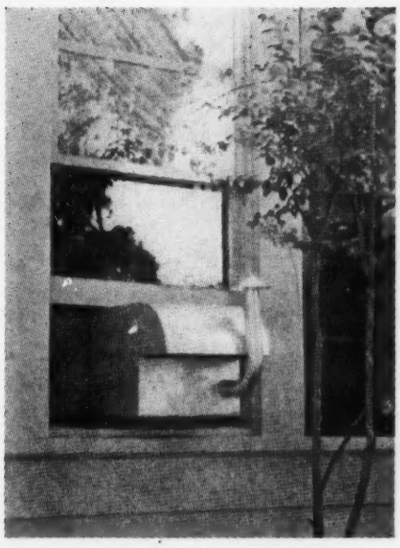
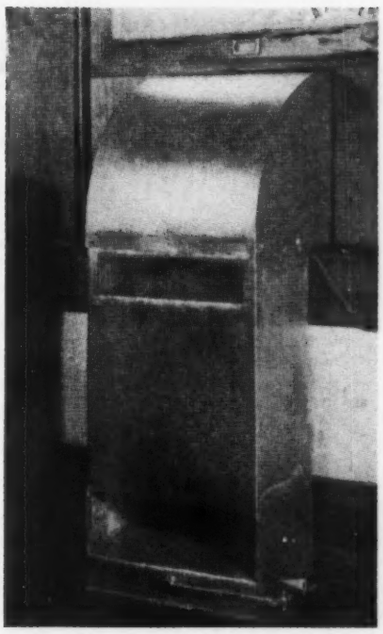


Fig. 23. (Right)—Photo of installed unit in a room of an Austin residence (indoors).

Fig. 22. (Left)—Photo of installed unit in a room of an Austin residence (outdoors).



Construction Details of Unit

The design of the fan, filter, and heater unit used for the relief of cedar-pollen hayfever depends on several factors. The fan must deliver sufficient air to completely change the air in the room to be conditioned at least once every 5 minutes. This must be accomplished without creating any objectionable noise or undesirable vibration. The filter can be any standard filter that will remove all but a small percentage of cedar pollen. The replaceable cellulose mat filter adapts itself very well to use in this type of unit. It is a filter that depends on sieve action to remove foreign particles from the air, thus the more area installed the more efficient it will be. From this standpoint it is best to install about twice as much surface as the manufacturer specifies. It should be placed on the suction side of the fan in such a manner that it is protected from the motor vibration and can be replaced easily.

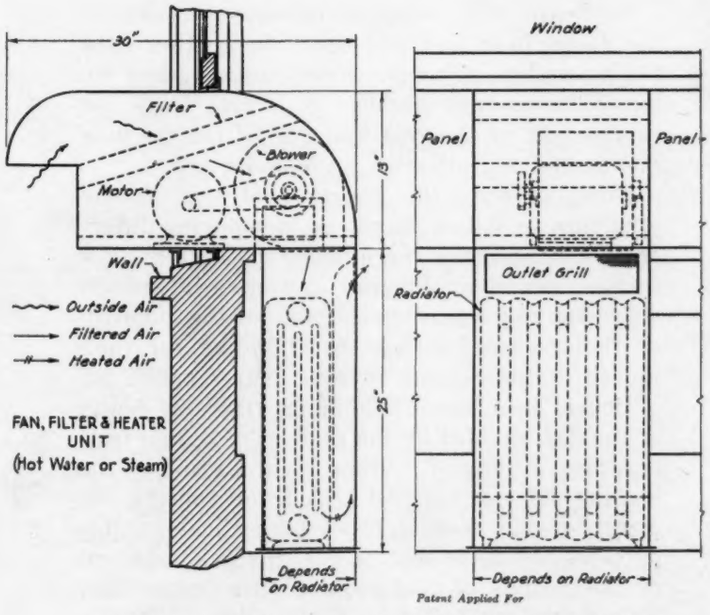


Fig. 21—University of Texas fan-filter-heater air conditioning unit for use with hot water or steam radiator.

As this unit supplies 100 per cent fresh air, some form of air heater is necessary. The type of heating system already in the room usually governs the type of heater to be used in the unit. It is possible to use gas, electricity, hot water, or steam. If gas is used care must be taken to prevent the flue gases from escaping into the room. The general shape and arrangement of the various parts mentioned is governed by the designer and the available materials.

The experimental unit built by the authors was designed to be located in a window and use gas as a heating medium. The general layout and approximate dimensions are shown in Fig. 19. This unit was designed so that the fan and filter could be readily separated from the heater. Figure 21 shows how this same fan and filter arrangement could be used with hot water, or steam as the heating medium.

The frame was built of 1x1x1/8 in. angle iron and covered with No. 20-gauge sheet iron. The top cover is readily removable so that the filter can be replaced and the fan and motor can be serviced. Figures 22 and 23 show photographs (indoors and outdoors) of the unit as installed in a window of an Austin residence.

Conclusions

This bulletin describes some of the causes, effects, and methods of relief for hayfever, the ever-increasing man-made disease, which can be controlled only by a complete understanding of its significance and the subsequent coöperation

(*Continued on page* 120)

The DEGREE-DAY—

What it is, How it was Formulated, Its Practical Value and Application

By Lorin G. Miller

Head, Dept. of Mechanical Engineering, Michigan State College and
Chairman, Michigan State College Short Course Committee
National Warm Air Heating and Air Conditioning Association

IN a debate broadcast by radio some time ago the then Assistant Attorney General of the United States, Mr. Robert H. Jackson, made the remark that our government had not yet been able to regulate the weather.

Neither have any of us as heating men been able to do more than talk about the weather, but we have found a way to predict how much coal or oil or gas or corncobs we may expect to use to heat a given structure to a given average inside temperature for any given period of days or months after we have determined the number of British Thermal Units of heat that are going to be lost from the structure per hour per degree difference in inside and outside temperatures.

The tool to which I refer is the so-called Degree Day. The Degree Day is the brainchild of Mr. Eugene D. Milener of New York City and was first proposed by him in April, 1916, and officially adopted by the American Gas Association early in 1919. It later made its appearance in the American Society of Heating and Ventilating Engineer's Guide.

Degree Day Defined

By definition, the number of Degree Days per day is simply the difference between 65° and the daily mean temperature outside, during any twenty-four hour period when this mean is less than 65°. To explain, if the outside temperature from 6:00 p.m. yesterday to 6:00 p.m. tonight averaged 40° we would subtract 40 from the base temperature of 65° and say that yesterday had 25 Degree Days.

Or, we could take the average outside temperature as recorded at our weather bureau for any month, subtract this figure from 65 and multiply by the number of days in the month. The result would be the number of degree days in the month in question.

Some of you may ask why we select 65° as the base temperature for residence heating computations. This was done as a result of tests in hundreds of gas heated homes and was later proved substantially correct by a series of tests conducted by the National District Heating Association in 163 buildings in 22 different cities heated by metered steam.

This figure of 65° was first set up as the average temperature maintained in a home heated to 70° for 16 hours during the day and 55° for 8 hours at night.

Bases other than 65° are used for various types of structures. A factory would be figured on a base of about 60° while apartment houses are usually based on 68° to 69° average inside temperature.

Use in Estimating Fuel Consumption

The question now arises as to the purpose served by this Degree Day system.

To begin with, weather bureaus throughout the states have recorded accurate weather data for a number of years. From these figures we know the average number of Degree Days for each month of the year and a total for the nine months from September to May inclusive.

Now, knowing the hourly heat loss of our structure in B.t.u's. per hour, per degree difference, and knowing the number of Degree Days in the normal or 65 year average winter it is very easy to prepare an estimate of the quantity of fuel required to heat the building for each month of the heating season. The formula is:

Hourly heat loss of building, times 24 hours of the day, divided by the product of design temperature difference (80 in East Lansing), the heating value of the fuel in question and the efficiency of the heating plant (a decimal). This gives us the cubic feet of gas, the gallons of oil or the pounds of coal required per degree day. This figure multiplied by the number of Degree Days in the normal heating season gives us the

season's fuel requirement.

This degree day method gives us what we believe to be the best and most easily used means of estimating how much fuel a given structure will require. There are a few things, such as wind velocity and solar radiation which this method does not take into consideration, but it is no doubt the best tool now at our disposal.

It offers a very conclusive answer to the question why is my gas bill higher than it was last month, or why did this last tank full of oil last only three weeks instead of four as it did on the previous filling, or why did I use up this last ton of coal in two weeks when the last ton lasted three weeks.

The gas industry uses the degree day for an additional purpose. By dividing a customer's monthly consumption of gas by the number of degree days in the period covered by his gas bill a figure which is fairly constant month after month is obtained. This figure is watched each month and if it gets out of line the customer has either changed his living habits or someone has changed the adjustments on the gas burner, etc.

The oil burner salesman or the fuel oil dealer can use this method very easily. All he needs is a gauge to tell him the number of gallons of oil in the storage tank on each of two dates. Then he can divide the number of gallons used by the number of degree days between the two dates, and make his comparisons.

The stoker man or the coal dealer can follow the example of a Pennsylvania coal wholesaler. They have for a number of years supplied their dealers and the coal trade generally with charts showing the number of degree days in various cities. They then issue a weekly bulletin showing degree days, and their retailers use these figures in answering complaints about the rapid burning of coal during cold periods. In one specific instance a hospital claimed it had burned in three months of a certain year 16% more coal than in the same three months of the prior year. By use of degree day figures for the two years, it was possible to show that the heat requirement for the period was actually 21% greater than in the prior year and that the burning efficiency of the coal, in fact, was better.

By means of the degree day system we can show a customer in advance that he is going to spend approximately 2% of his year's heating appropriation in September, 6% in October, 12% in November, 17% in December, 19% in January, 17% in February, 15% in March, 8% in April and 4% in May for a given locality.

To simplify calculations we start with the number of degree days on September first (if any) and add each day's number of degree days, thus keeping a cumulative record. The number of degree days between any two dates is then at our finger-tips by subtracting the cumulative totals for the two dates in question.

In conclusion, both theory and thousands of actual cases have proved that the cost of heating varies directly and almost exactly as the difference between 65° and the outside temperature. In other words, the number of degree days in any month determines the cost of the fuel used that month.

Condensation in Modern Buildings (*Continued from page 47*)

through the barrier depends largely upon the vapor resistance of that part of the wall outside of the studs. If, for instance, the sheathing paper be an excellent vapor barrier one may expect most of the vapor to condense on the sheathing or sheathing paper, just as it did under the conditions we selected for Fig. 2A. If, on the other hand, the vapor resistance of sheathing paper and siding be very low, most of the vapor may escape to the outside atmosphere without condensation. We have chosen to illustrate this condition in Fig. 2B by showing the dewpoint temperature (the dotted line) as always below the atmospheric temperature. It must be obvious that as close an approach as possible to this ideal condition is desirable from the moisture standpoint, and our present tentative recommendations call for high vapor resistance on the warm side of the wall, and low vapor resistance on the cold side. These recommendations will doubtless be modified in detail as we learn more about the whole subject and especially about the extent to which rain driven under the siding by the wind is a factor.

Figure 3A shows the calculated temperature gradients through an uninsulated wall and Fig. 3B those through a wall having ¾-inch fiber board sheathing in place of wood sheathing. As the heat loss through walls of those types is greater than through walls containing fill insulation, the sheathing temperatures are higher than those shown on Fig. 2A, and consequently the vapor presssure differences are reduced accordingly. This in turn means that less condensation would occur at the same outside temperature in walls of these types than where fill insulation is used, other factors being alike.

[To be continued]

Below exterior and facing plans of one of the nine two-story chicken houses on the Seaver Farm. Stoker-fired warm air, mechanically circulated showed a fuel cost of $225 as compared with $800 for oil in circulating heaters. The plans show the new system.

By R. C. Nason

Stoker-Fired Furnace Reduces Fuel Cost 72% (Estimated)

CONSIDERABLE significance is believed attached to the successful warm-air heating by the forced circulation, full duct plant in a 100-ft. by 50-ft., two-story poultry building on Seaver Broiler Farm, Hauppauge, L. I. So far as is known, this is the first such system of its type in so large a building in this district. The benefits, consisting largely of fuel economy, are felt by Liberty Research Laboratory, Farmingdale, L. I., contractor, to forecast the more universal adoption of warm air for this class of structure.

Seaver Broiler Farm raises 150,000 chickens yearly, practically always having some 60,000 birds in preparation for market. The proprietor purchases day-old chicks, develops them in progressive stages over a three-month period, then sells them as broilers at prevailing market prices. This procedure varies somewhat from farming methods wherein chicks are raised to maturity, then sold, or, again, keeping the hens for egg-selling purposes. In the partially-matured cultivation procedure used at Seaver Broiler Farm there are no roosts, nor, of course, nests. Floors consist of gravel, peat moss and other materials, with chickens resting overnight on floors.

The primary motive in the proprietor's mind when he purchased the warm-air heating system was to save fuel, but he also had the idea of keeping the fowl in prime condition by means of fresh air circulation, because, it is said, poultry need plenty of fresh air, far more than most other animals of like size and weight.

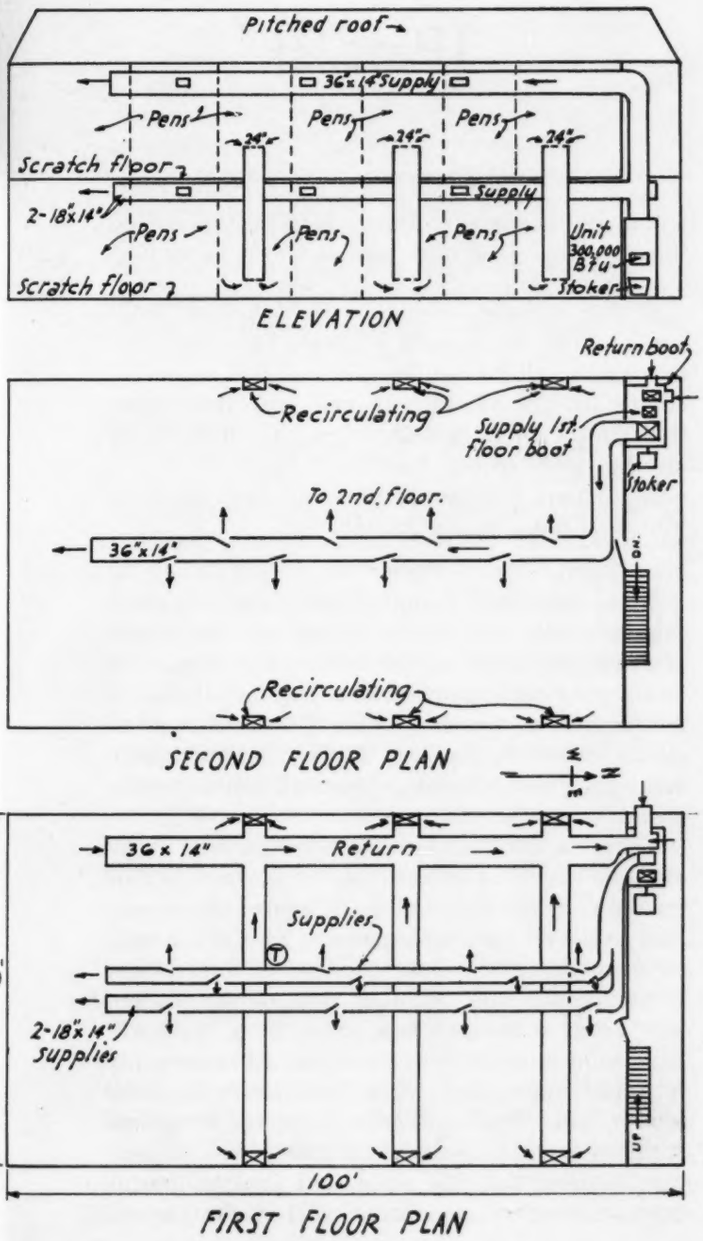
The other nine large poultry houses that comprise the Seaver farm have been heated with oil, consumed in numerous liquid-fuel unit heaters of the circulating type placed at intervals over the floor unit without duct distribution of the warm air. While heating and conditioning results were satisfactory, fuel costs were high. Actually, this poultryman has an annual oil bill of about $8,000.00. The expense ate into profits in a discouraging way.

This poultryman selected for his initial installation of "air conditioning" a two-story frame building with pitched roof. Length is 100 ft., width 50 ft. At one end is a 9-ft.-wide area that runs entirely across. It was here that a Fitzgibbons "Directaire" unit was placed. Plant capacity in heat output is 300,000 Btu per hour. The blower stepped up above its in-

itial rotative speed now handles 4,500 cfm.

Fuel, mechanically charged by a Norge stoker, is fine bituminous; what is known locally as "stoker pea." Coal analysis runs high, it being considered top grade fuel of its class. The unit is under thermostatic control with an ordinary room thermostat placed on a post about in the center of the first floor, but two-thirds of the distance between the heater and the far end of the building. No thermostat is used for the second floor. Set for 60 degrees, the automatic control maintains this temperature, with the help of partial recirculation in severe weather and full fresh-air supply in mild weather. The proportion of outside to recirculated air is adjusted by hand slide dampers at the recirculation duct connection of the unit.

Air-supply, both quantity and quality is deemed one of the most important features of air conditioning in poultry buildings because proper ventilation prevents disease; ventilation neutralizes excessive ammonia fumes (from droppings) and poultry need large quantities of fresh air. Thus, air supply damper management almost becomes a fine art.



Control of Return Air

In controlling air-supply quality at the Seaver Broiler Farm there are two return grilles in addition and supplementary to the main recirculation duct connection. One inlet is through an outer wall near the heater, to take in fresh air entirely. Another inlet is open to the 9-ft. area wherein the heater is installed. Air derived from this source, while not so pure as that coming in from outdoors, is, nevertheless, of good quality and tempered. It might also be stated that every effort is made to use as much outdoor and heater-room air as possible and as little recirculated air as possible due to the ammonia content of recirculated air, believed harmful to the comfort and good health of the chickens. A slide damper allows shutting off recirculation and, except in severe weather, and usually at night, recirculation is closed.

Duct Costs Reduced by Simplification

The sheet metal contractor installed his warm-air supply ducts overhead and centrally down the length of the building. The generous size of the plant permits running two supply-air trunks, each 36-in. by 14-in. to each floor. The first-floor trunk, however, is divided into two 18-in. by 14-in. mains, whereas the upper floor main is 36-in. by 14-in. over its entire length of 75 ft. as a lateral. Warm air openings are about 8 feet above the first floor and about 9 feet above the second floor when the ceiling is the pitched roof.

To keep installation cost at a minimum, the contractor cut 8-in. by 10-in. openings every 20 ft. in the sides of the overhead ducts, shoving the metal at these points inwards to become scoops. While this is not considered the most approved way of delivering air, in this class of structure it is allowable. By bending the air-scoops, any degree of opening can be had. An effort was made, by adjusting scoops, to see that remote openings discharge their proportionate air volume. This method of volume control is considered satisfactory by the owner. The building, at the same time, is maintained at comfortable temperature required by healthy poultry. Outlet temperature at the heating plant is 140 deg. F.

The economy of cost applied to the installation

(*Continued on page* 130)

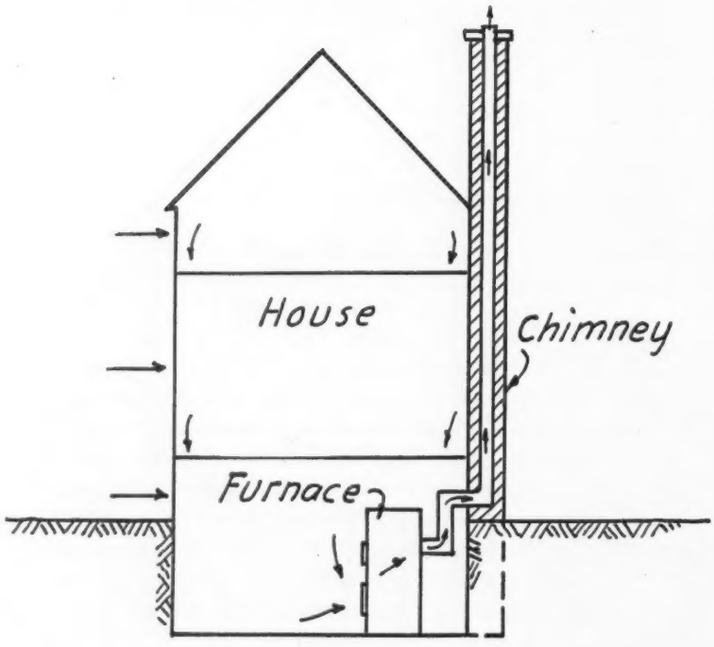


Fig. 3

CHIMNEYS*

Particularly chimneys for domestic oil-fired heating plants

By W. O. Lum

Consulting Engineer,

Air Conditioning and Commercial Refrigeration Department,

General Electric Company

[Part 2]

HAVING established that the draft available on any given chimney is determined by the temperature difference between the gases in the chimney and the surrounding atmosphere, it may be well to consider some of the other factors which may affect the performance of a chimney:

1. If air is to flow freely through the furnace and into the chimney, some provision must be made for admitting this air to the furnace room. In ordinary residence construction there is sufficient leakage through windows, doors, floors, etc., so that ample air for combustion is available. In some structures, however, the furnace room may be sufficiently tight so that a perfectly good chimney cannot do its job. In these cases, special provision must be made for combustion air requirements into the furnace room.

2. The fact that the flue gases from the furnace may be at temperatures of 400, 500 or 600 deg. F. does not in itself assure that the temperature of the gases throughout the chimney will be sufficiently high to give the required draft, for it often happens that the heat loss from the chimney will cool the gases to a point where insufficient draft is available. Large, massive chimneys on the outside of a house sometimes give trouble during the warming up period, due to the fact that the cold chimney structure absorbs most of the heat in the gases until it is sufficiently warm.

3. The size (cross-section area) of the chimney flue must be suited to the furnace with which it operates. If it is too small, the available draft will be lost in pressure drop, due to friction within the chimney. If greatly over-sized the gases may lose their heat.

4. The chimney should be tight against leakage, because if too much air leaks into the chimney, there will be insufficient draft due to the increase in the amount of gas that must pass through the chimney and the cooling effect of the air that leaks in. It follows, of course, that the ideal furnace flue should have no other openings into it—fireplaces, stoves, etc.

Condensation

Up to this point we have considered only those factors which are important from the standpoint of draft and these are the factors that appear to be of greatest importance to the installer of a combustion device, for, unles the draft requirements necessary for any given piece of equipment are provided, the equipment will not operate successfully.

There is another factor, however, not at all obvious which is exceedingly important to the building owner and indirectly, therefore, important to the oil heating industry. This is the matter of condensation of the products of combustion. If any of you care to collect some of the condensate from a furnace flue or chimney, you will have what appears to be water but which actually is dilute sulphuric acid, approximately 1% sulphuric acid. This is a highly corrosive compound which will attack most of the metals used in boilers, furnaces and flue pipes, and also the mortar used in masonry structures. All of the present

*Paper delivered to a group of oil burner dealers in New York City, Feb., 1940.

day domestic fuels—oil, coal or gas—contain sulphur in some amounts. When fuel oil is burned the hydrogen in the fuel oil, together with the water vapor in the air, gives a resultant water content in the products of combustion of more than 1 lb. of water for every pound of fuel burned.

200 Deg. Is Minimum Chimney Temperature

The amount of sulphur in any fuel has a great influence upon the temperature at which the water vapor condenses. Exact knowledge in this connection is not available at this time, but experience indicates that temperatures above 200 F. are sufficient to prevent condensation in the flue gases of ordinary domestic fuel oils. On this basis, therefore, it is evident that for the conventional type of masonry chimney now in use, the lowest temperature of the flue gases leaving the chimney should not be under 200 deg. F. Of course, if the lining of any chimney is resistant to the action of sulphuric acid, we need have no concern about the chimney itself, but some provision must be made at the base of the chimney for disposing of this corrosive compound.

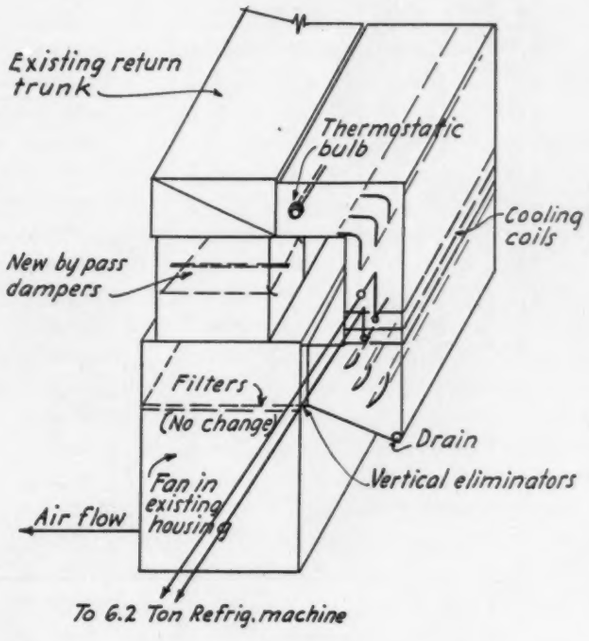
The average domestic heating plant, fired at the rate of 2 gal. per hr. or more, rarely causes trouble due to chimney condensation in ordinary masonry chimneys. The total heat available in the flue gases from this amount of fuel is usually ample to maintain sufficient temperature in the chimney to prevent condensation. Many of us have learned, however, that oil-fired plants burning from 2 to 5 gal. per hr. will destroy an outside, bare steel stack in a surprisingly short time.

100,000 Btu Furnace Is a Problem

The advent of the modern small home with the highly efficient automatic oil fired heating plant involves problems from the standpoint of chimney condensation not experienced in the past. Consider a modern small oil-fired heating plant burning oil at the rate of .75 gal. per hr., or a total heat input of approximately 105,000 Btu per hour. Assume 80% combustion efficiency. This leaves us with approximately 21,000 Btu per hour total heat in the flue gases (20% of 105,000 Btu). Of this total heat, approximately 6,800 Btu per hour is represented by the water vapor in the flue gases, which may begin to condense at a temperature of 200 deg. F. It is apparent, therefore, that with this limited amount of heat available in the gases as they leave the furnace, considerable care must be taken to conserve this heat until it leaves the top of the chimney. It appears at this time that there is room for improvement in the design of chimneys for domestic oil-fired heating equipment, and that the ideal chimney might be made with a very light, fireproof, acid-resistant tube surrounded by a layer of fire-resistant insulation and then a suitable casing for permanently retaining the insulation, with architectural and decorative effects added as desired.

Packaged Cooling Unit For Conversion Work

In the October, 1938, AMERICAN ARTISAN, D. D. Zink, Kansas City, reported an installation where a winter air conditioning system was planned for future cooling. The return trunk was carried across the top of the blower housing and dropped straight down. When cooling was installed, the idea shown in the sketch was used. In explanation, Mr. Zink says: "The addition consists of a compact package unit resembling a wardrobe trunk and containing a sound and dust proofed compressor, condenser and receiver assembly and the simple by-pass arrangment pictured, which contains the cooling coil. This, with the speeding up of the fans, completes the system. The cost of the cooling was about $1,400. The operating cost for water and electricity has been less than one dollar per day. The old risers between the fan housing and the return duct at the ceiling have manual dampers which, when opened, allow partial by-pass of the cooling coil and greater or lesser de-humidification. Air, either direct in winter or through the coil or proportions of both, enters above the filters to provide for cleaning under all conditions. The arrangement is adaptable to many existing winter air conditioning installations."



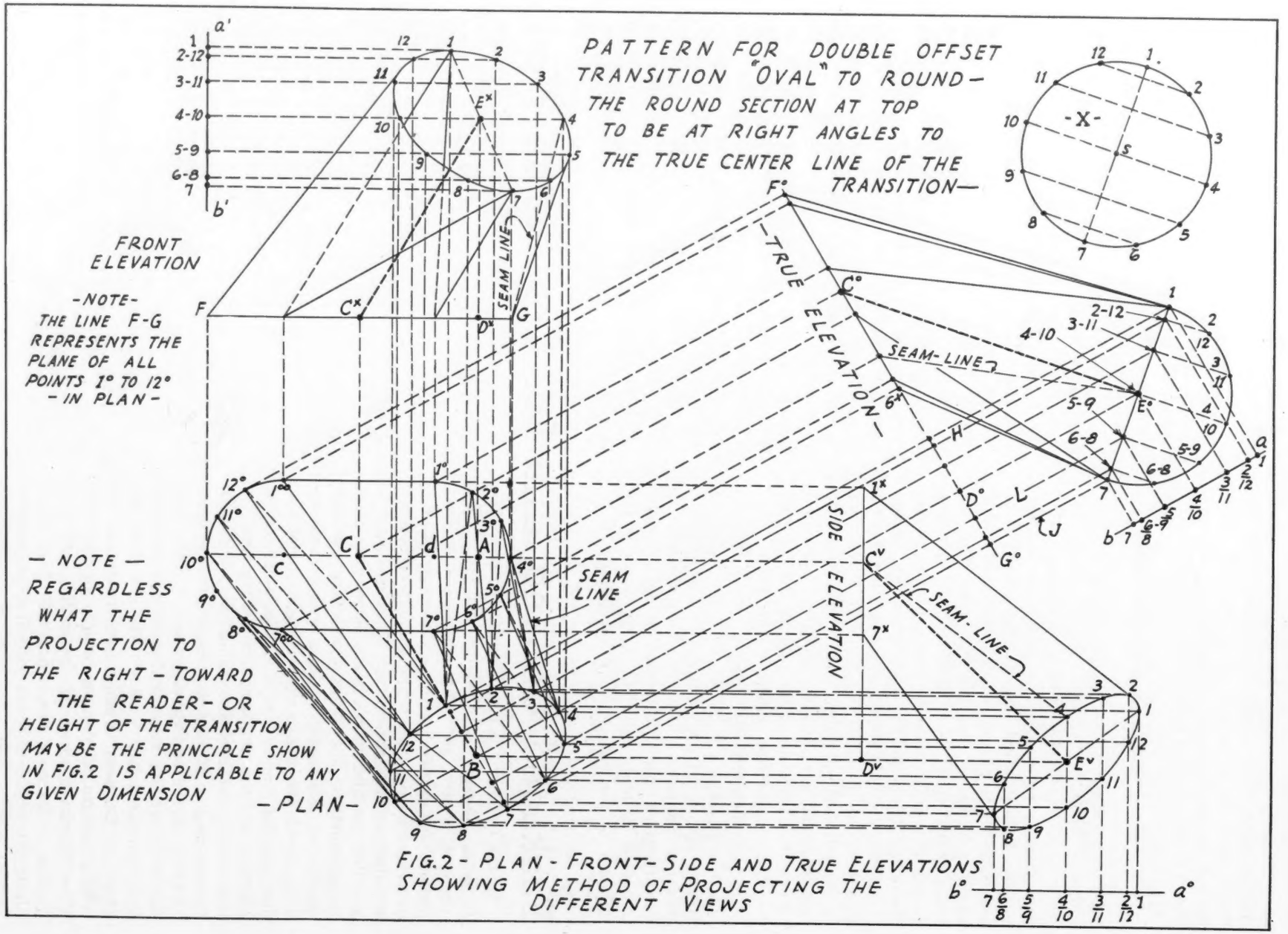

PATTERN FOR DOUBLE OFFSET TRANSITION "OVAL" TO ROUND—
THE ROUND SECTION AT TOP TO BE AT RIGHT ANGLES TO THE TRUE CENTER LINE OF THE TRANSITION—
FRONT ELEVATION
-NOTE-
THE LINE F-G REPRESENTS THE PLANE OF ALL POINTS 1° TO 12° - IN PLAN -
SEAM LINE
TRUE ELEVATION
SIDE ELEVATION
SEAM-LINE
SEAM LINE
— NOTE —
REGARDLESS WHAT THE PROJECTION TO THE RIGHT - TOWARD THE READER - OR HEIGHT OF THE TRANSITION MAY BE THE PRINCIPLE SHOW IN FIG. 2 IS APPLICABLE TO ANY GIVEN DIMENSION
- PLAN -

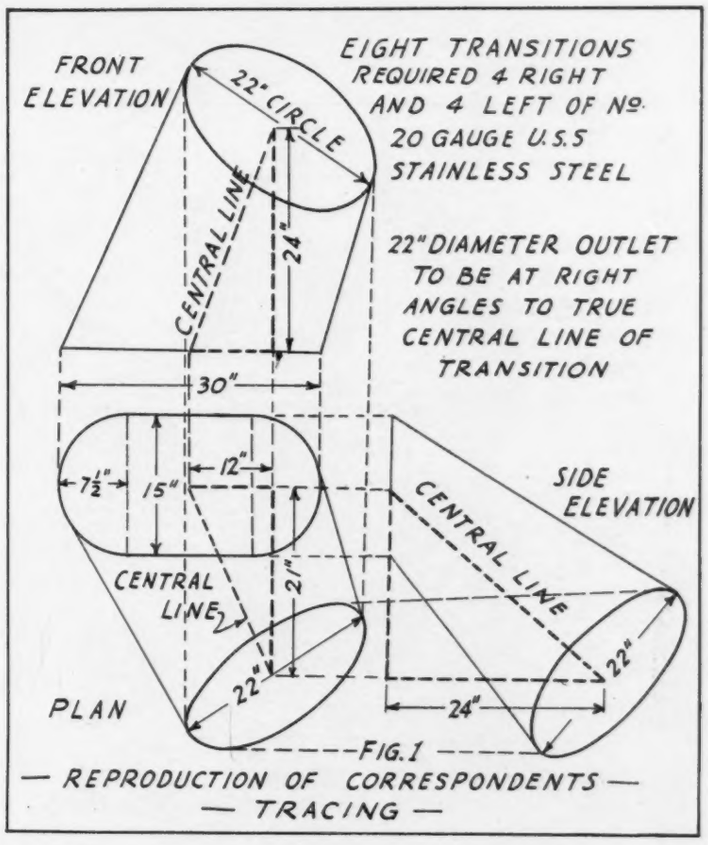
FIG. 2 - PLAN - FRONT - SIDE AND TRUE ELEVATIONS SHOWING METHOD OF PROJECTING THE DIFFERENT VIEWS

Pattern for a Double Offset Fitting* [Part2]

By William Neubecker

Head Instructor
Sheet Metal Department, New York Trade School

Part I of this problem (September issue) explained how the true plan and true elevation were obtained. Also how the side and front elevations are laid out. Part 2, this issue, completes the development.



Developing the Pattern Shape

THE next procedure is to find true lengths necessary in laying out the pattern shape. Refer to the plan in Fig. 2 and note how the various divisions are connected by the solid and dotted lines. Always be careful to connect the points in the *upper part* of the round top in plan *4* to *1* to *10*, to the points in the *upper part* of the "oval" base *4°* to *1°* to *1°°* to *10°* and the *lower part* of the round top *4* to *7* to *10* to the *lower part* of the "oval" base *4°* to *7°* to *7°°* to *10°*. So we draw solid lines from *1* to *1°* and *1°°*; *2* to *2°*; *3* to *3°*; *4* to *4°*, and so on. Dotted lines are drawn to connect opposite corners as *1* to *2°*; *2* to *3°*; *3* to *4°*; *4* to *5°*, etc., until all connections are made.

These solid and dotted lines will represent the bases of triangles to be constructed whose altitude will be equal to the *vertical* height of transition shown from *D°* to *E°* in the true elevation. The diagram of true lengths of solid lines is shown in Fig. 3 and those for the dotted lines in Fig. 4. For example, we will find the true lengths of the two solid lines shown in plan in Fig. 2 numbered *12* to *12°* and *7* to *7°*. Fig. 3—page 60.)

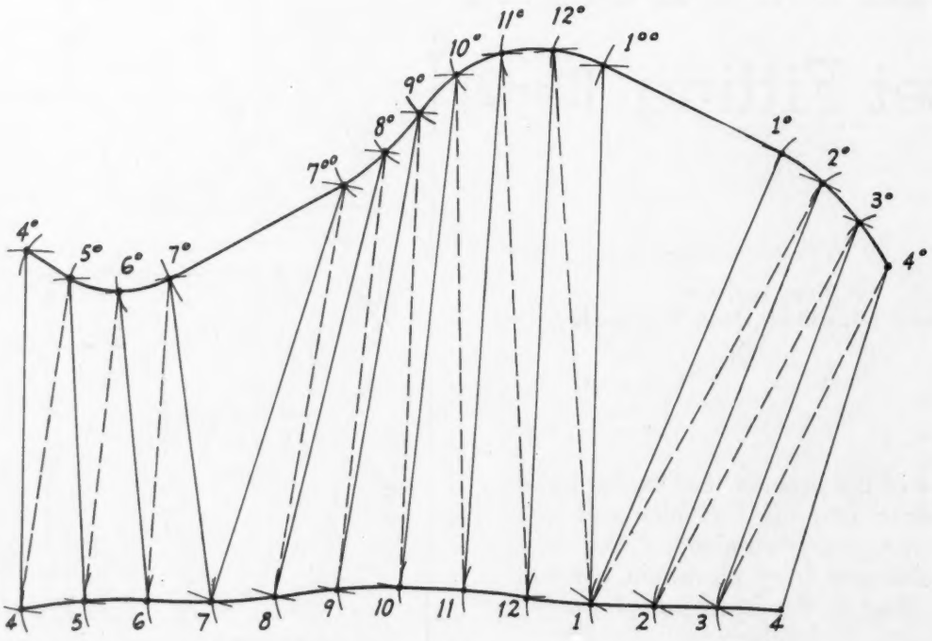
In Fig. 3 draw any right angle *1-X-10°*. Now take the distance from *12* to *12°* and *7* to *7°* in plan in Fig. 2 and set them off in Fig. 3 from *X* to *12°* and *X* to *7°* as shown by similar numbers. Now refer to the true elevation in Fig. 2 and, measuring from the base line *F°-G°*, take the vertical heights to *12* (indicated by the vertical line marked *H*) and *7* (indicated by the vertical line marked *J*) and place these two heights in Fig. 3 (measuring in each instance from the corner *X*) as shown by *12* and *7*. Draw lines from *12* to *12°* and from *7* to *7°*, which will be the true lengths of similar number lines in plan in Fig. 2.

The same method is used for finding the true lengths of the dotted lines. For example: To find the true length of the dotted line *5* to *6°* in plan, set off this distance in Fig. 4 on the horizontal line, measuring from the corner *Y* in the right angle *1-Y-12°* as shown by *6°*. Next measure the vertical height from the line *F°-G°* in the true elevation in Fig. 2 to point *5* (indicated by the vertical line marked *L*) and place this height in Fig. 4, measuring from the corner *Y* on the vertical line, as shown by *5*. Draw the dotted line *5* to *6°* which will be the true length of similar numbered dotted line shown in plan in Fig. 2.

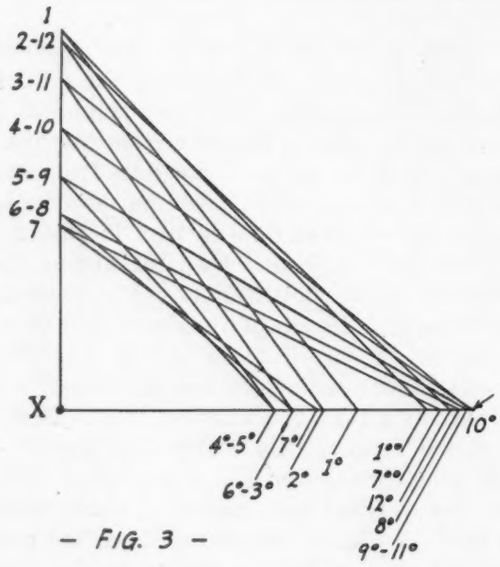
Having found all of the true lengths in the manner just described, the pattern can now be developed. Assuming that the seam of the transition is desired on the line *4-4°* in plan in Fig. 2, take the true length of the solid line *4-4°* in Fig. 3 and set it off on any vertical line as shown by *4-4°* in Fig. 5. Now with *4°-5°* in plan in Fig. 2 as radius and *4°* in Fig. 5 as center, describe a short arc near *5°* and intersect it by an arc struck from *4* as center with a radius equal to the true length of the dotted line *4-5°* in Fig. 4. Now with

(*Continued on page* 88)

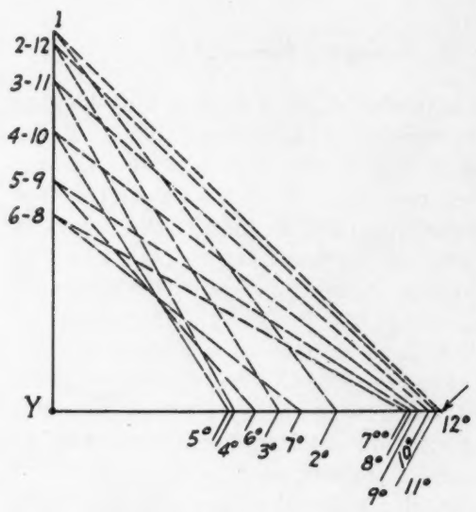
*All rights reserved.



— FIG. 5 FULL PATTERN —

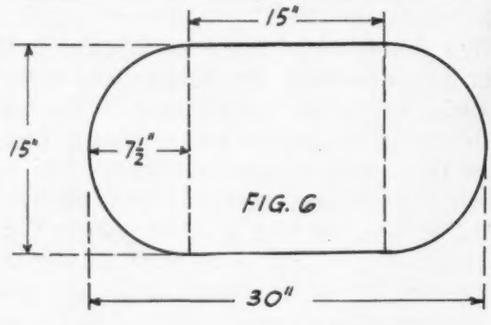


— FIG. 3 —



— FIG. 4 —

← TRUE LENGTHS OF SOLID LINES → ← TRUE LENGTHS OF DOTTED LINES →



COMPUTING DIAMETER OF OUTLET

AREA OF CENTER SQUARE 15" x 15" = 225 SQ. IN.
AREA OF 15 IN. CIRCLE 15 x 15 x .7854 = 177 SQ. IN.
225 + 177 = 402. $\sqrt{402 \div .7854} = 22\frac{5}{8}$ INCHES
THE DIAMETER OF ROUND TOP OUTLET.

NOTE — TO OMIT COMPUTATION USE TABLE OF CIRCUMFERENCES AND AREAS — AS EXPLAINED IN TEXT. —

AMERICAN ARTISAN

SHEET METAL SECTION

DEVOTED TO SHEET METAL CONTRACTING AND FABRICATING

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Aside from the greater durability of Superior Copperior sheets, under adverse conditions, these sheets conform to the same high standards of all Superior sheets for uniformity of temper and workability. Another advantage that many sheet metal workers like is the uniform bright spangles of these and other Superior Galvanized sheets. Superior Copperior sheets are available from Superior jobbers in principal cities.

THE SUPERIOR SHEET STEEL COMPANY, Canton, Ohio
Division of Continental Steel Corporation, U.S.A.

SUPERIOR

OPEN HEARTH STEEL SHEETS

Photo No. 1—This hip failed and had to be patched because the battens on the slope have their covers soldered to the hip batten.

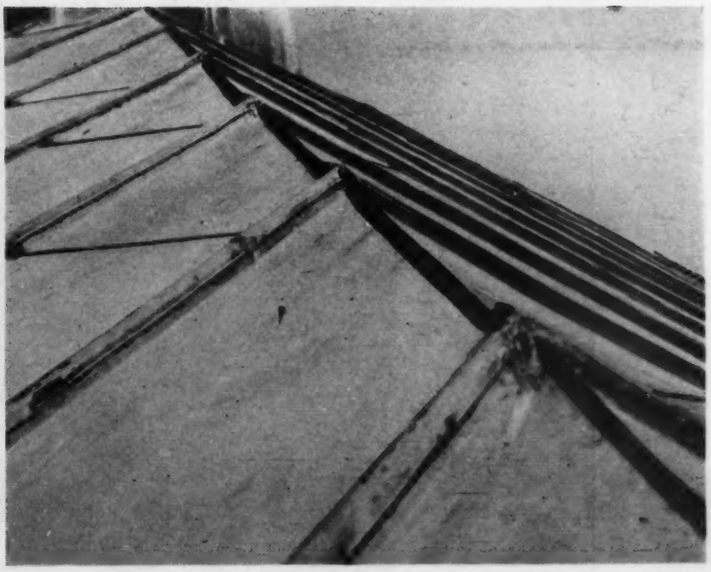


Photo No. 2—A lot of solder has to be used and a very poor looking job results when batten slopes are brought together in a standing seam at a hip. .A batten roof should have batten hips.

Intersections-- [Part 2]

Part 1 of this discussion on Intersections (Sept.) described proper construction where standing seam areas meet. This article describes proper construction when the meeting areas are batten design. "Loose lock" is the key to trouble-free batten roofs.

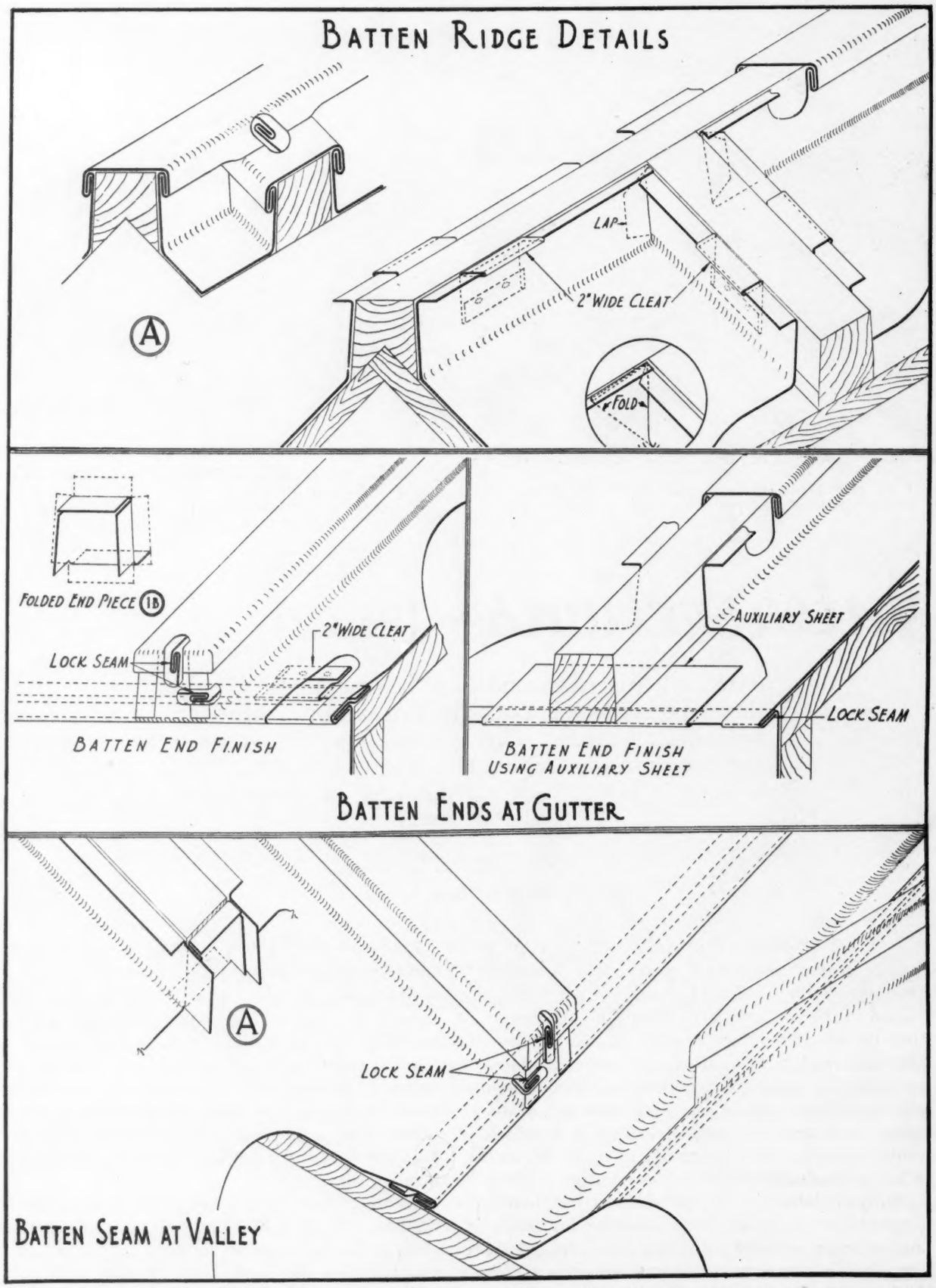
By Carter S. Cole
Engineer, Copper & Brass Research Ass'n

INTERSECTIONS in batten type roofing do not present so simple a construction as do the intersections in standing seam roofs that we discussed in the last article (September). However, they do not present an insurmountable problem, although, outside of poor gutter design, they are probably the most frequent source of trouble in copper roofing because of wrong handling of details. It is needless trouble, too, most of which centers around unnecessary use of solder because it is the "easiest way."

As we pointed out in a previous article, batten construction makes excellent provision for expansion and contraction by dividing a long horizontal area into a large number of smaller areas. This is fine—but if by excessive and improper use of solder this batten area is tied into other areas, or all batten areas are tied together, the whole effect of the batten construction is nullified, and trouble ensues.

Let us consider first the evidence that some of our photographs show, then we will take up the design that will avoid the trouble that has resulted from incorrect application. In Photo 1 we see what happened when battens intersecting a hip had their covers soldered to the cover of the batten of the hip (the "easiest way"), instead of loose-locked into it. The same applies to ridge intersections—they will not give good service with the kind of construction shown in this photograph either.

Another bad way to bring two batten slopes together that we have seen is to make a standing seam at the intersection. (Photo No. 2.) A large amount of solder is required to make such construction watertight in the beginning—it will not stay that way—and it makes a poor-looking job. Still another bad way to finish a ridge in batten construction is to use no batten at all (Photo No. 3.).



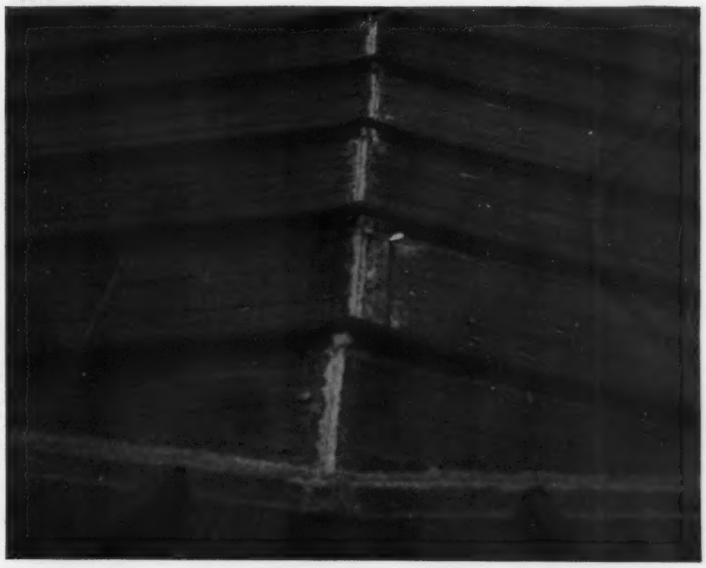
The correct construction for battens at ridges and hips is shown in the accompanying sketch. (Detail A.) The inset circle showing the fold-over corner is, we believe, the best detail to use. The sketch is easy to follow and therefore we shall not take the space here to describe it. Like the rest of the sketches that we have used in these articles, it is taken from the second edition of the Sheet Copper Handbook issued by the Copper & Brass Research Association, and the details

of construction are fully described therein.

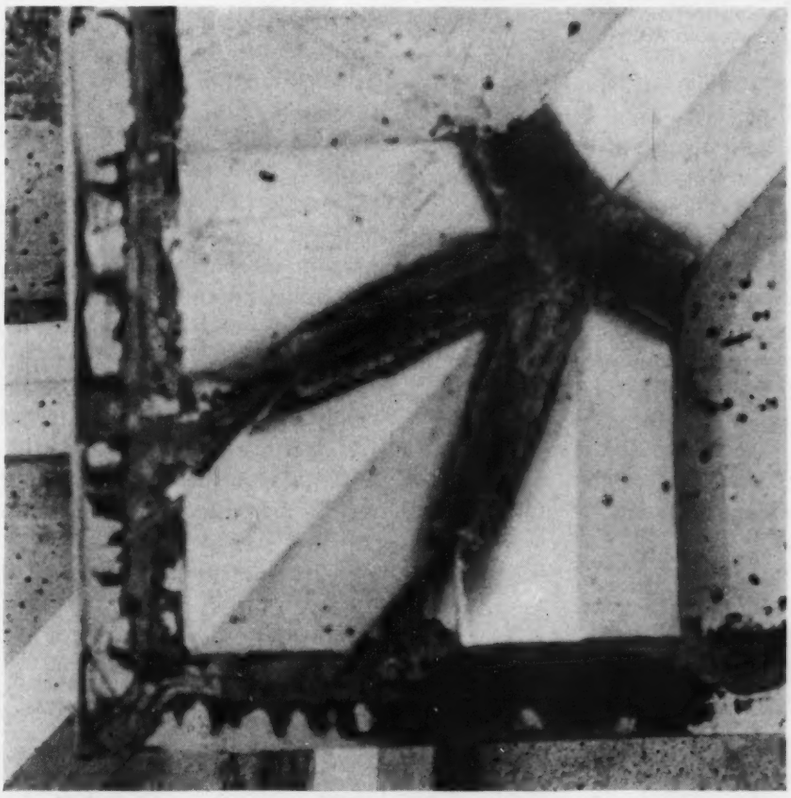
Improper batten details at eaves and at valley and gutter intersections are another potent source of trouble. Again excessive use of solder that ties the different roof areas together and does not permit movement in expansion and contraction is the underlying cause of "failures" at such intersections and in the adjacent roof areas. Photo No. 4 shows this bad habit of soldering a batten area to a gutter.

Those who have read the previous articles of this series will recall a number of other pictures that showed bad details of gutter interesections with batten areas. (Photos 1 and 3 of the third article in the August number in particular.)

If a batten area finishes at an eave, the battens should not be cut off before the edge is reached,



Above, Photo No. 3—The ridge batten was omitted from this roof and a lot of solder substituted. The gutter is also soldered to the batten areas and a great deal of trouble ensued.



Below, Photo No. 4—In this gutter (behind a parapet wall) the batten area is soldered to the gutter lining, the point of connection is too low, the gutter does not have adequate pitch, and no expansion joint was used. (P. S.—Leaks gave a lot of trouble.)

Left—Photo No. 5—This picture looks down vertically on the corner of an upper roof. Part of the lower roof is also shown. The batten should have been carried out to the eave, not cut off short, and here again too much solder has been used.

but should be carried to the edge and the metal locked over an edge strip. (See Photo No. 5 which, incidentally, is taken looking straight down on a corner of an upper roof area and shows, beyond the edge, part of the lower roof.)

Photo No. 6 shows the soldering of batten pans to valley metal—a fruitful source of trouble as already indicated. Photo No. 7 shows more bad practice—battens cut short of pan sheets and batten areas soldered together. Further examples could be cited but they would only be a repetition of what has already been shown—the use of too much solder as the "easiest way."

How do you avoid these troubles? Look at the

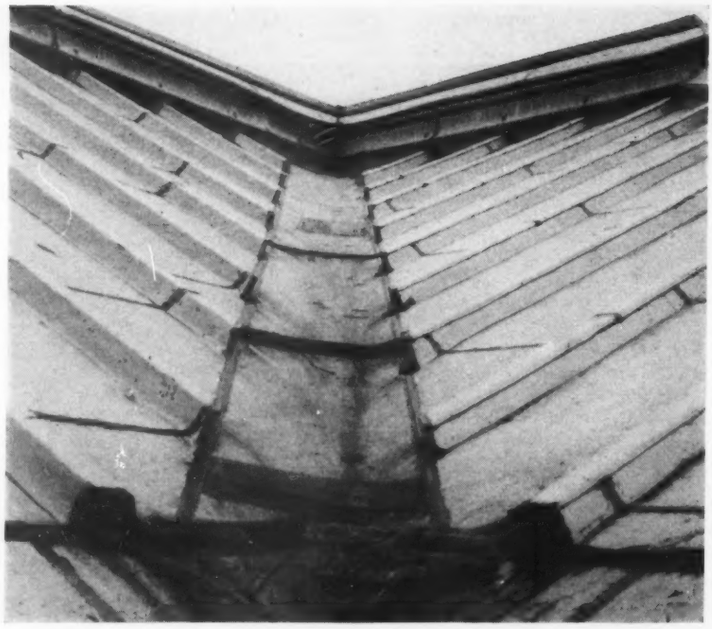


Photo No. 6—Soldering of batten pans to valleys and of batten areas to flat seam construction below it is absolute assurance that trouble will result.

accompanying sketches and you will see the type of construction that will give good service. Use loose-lock construction that separates the various roof areas at their intersection points.

We do not wish to dwell too much on detail, but it might be well to point out some of the essential features shown in these sketches. In the ridge detail (A) the ridge batten is higher than the battens coming up the slope. By following the scheme shown in the small inset (folding back the corner of the sheet) it is possible to finish this detail without solder—a very desirable feature of this design. Where the ridge is over 50 feet long some provision for expansion of the ridge batten cover should be made. This can be done by introducing some type of slip joint at intervals of 30 or 40 feet. Such joints may be accomplished by merely lapping the sheets 6 or 8 inches and filling the lap with white lead. Hips usually have sufficient slope so that 8 foot strips, of which the batten cover is normally constructed, can be lapped 3 to 4 inches and give a perfectly watertight construction.

"Don'ts" for Batten Roofing

A roof should be so designed that water cannot stand against batten ends at the gutter line. As indicated in the sketch, a drop in level at this point is very desirable so that the finish of the end of the batten overhangs the gutter and there are no solder connections whatever between the sheets or the battens and the gutter metal. Additional protection can be afforded by using the auxiliary flashing sheet under the batten, as indicated in the right-hand sketch. The same type of construction can be used at an eave where there is no built-in gutter.

At a valley, or at a gutter where there is no drop in level between the slope of the roof and the gutter proper, the end of the batten should be finished in an auxiliary lock (an unsoldered connection, of course) and the valley or gutter metal continued up the slope beyond this point a sufficient distance to give the joint adequate flashing protection.

Intersections in flat seam construction are generally merely a continuation of the main roof surface. However, ridges and other high points usually present locations where expansion battens can be introduced into the construction.

Photo No. 7—The batten area should not have been soldered to the gutter and the battens themselves should have been continued to the junction of the batten pan and the gutter lining, not cut off as was done in this case.

Product Finishing

"Blushing" in Lacquers

By W. G. Sheane
Chemical Engineer, General Electric Co.

ONE of the principal difficulties encountered in organic finishing is the "blushing" of lacquers. This characteristic of some lacquers manifests itself first under certain conditions in the appearance of the film. During drying, clear lacquers show a turbidity or opacity, while colored, pigmented materials exhibit surfaces which appear milky white. Also, after complete drying the film may be glossy, or more usually dull and flat. Finally, the dried film may be quite brittle and generally lacking in film strength.

Three types of blushing exist. These are the so-called "gum blush," "cotton blush" and "moisture blush," all of which denote a precipitation of the non-volatile components of the lacquer. Gum blush and cotton blush may be remedied by a suitable adjustment of the solvent combination. It is a well known fact that the composition of the solvent mixture of a lacquer often changes during evaporation. If the diluent portion of the solvent possesses a higher rate of evaporation than the active solvent, and if the resins are not soluble in the active solvent, there comes a time during the drying of the film when the proportion of diluent is so low that the resin precipitates. This is known as gum blush. If on the other hand, the active solvent possesses a volatility greater than that of the diluent, and if the cellulose ester (cellulose nitrate, cellulose acetate, etc.) is not soluble in the diluent, evaporation will produce a solvent mixture high in diluent and the cellulose ester will precipitate to cause cotton blush.

"Blush" Caused by Humidity

Of the three kinds of blushing the last mentioned, moisture blush, is most common. However, the cause of the precipitation of the non-volatile portions of the lacquer is due to the presence of water rather than to the character of the solvents in the solvent mixture. Most solvents are more or less miscible with water and it is possible to have such an amount of moisture present in the drying film that the non-volatile solids, not being soluble in water, will precipitate out of solution.

Water in sprayed lacquer film may come from moisture which has condensed in the air line to the gun. More usually water in the lacquer film comes from the air after the film has been applied. Due to the cooling effect of the evaporation of the solvents, the air near the film is reduced in temperature below the saturation point, water condenses on the film and precipitation results.

Humidity and Its Measurement

Because of the important bearing of the moisture content of air on blushing the following discussion on humidity is included.

Humidity is defined as the condition of the

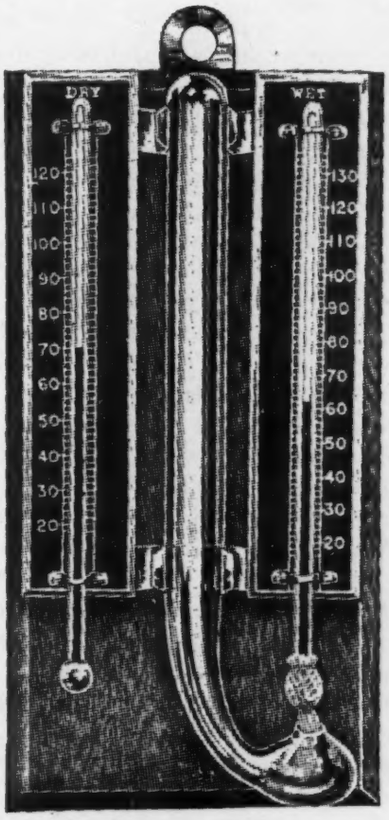


Fig. 1—Common type of wet-dry bulb thermometer with scales of temperature. An accompanying chart shows relative humidity for each pair of readings.

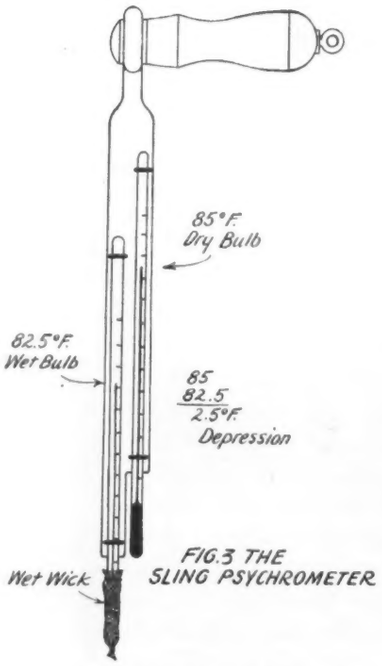


Fig. 3—Wet bulb thermometers do not read temperature correctly unless the wick is in moving air. The sling Psychrometer above is whirled to get a true wet bulb reading.

Partial Relative Humidity Chart

WET BULB TEMPERATURE °F.	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110	112
54	10	7	5	3	1	...	...	...	...	...	...	...	...	...	...	...
56	14	12	9	7	5	3	...	...	...	...	...	...	...	...	...	...
58	20	16	14	11	9	7	5	3	...	...	...	...	...	...	...	...
60	25	21	18	15	13	11	9	7	5	...	...	...	...	...	...	...
62	30	26	23	20	17	15	12	10	8	7	5	...	...	...	...	...
64	36	32	28	25	22	19	16	14	12	10	8	7	5	...	...	...
66	42	37	33	30	26	23	20	18	15	13	11	10	8	7	...	...
68	48	43	39	35	31	28	24	22	19	17	15	13	11	10	8	7
70	55	49	44	40	36	32	29	26	23	21	18	16	14	12	11	9
72	61	56	50	46	41	37	33	30	27	24	22	20	17	16	14	12
74	69	62	57	51	47	42	38	35	32	28	26	23	21	19	17	15
76	76	69	63	57	52	48	43	39	36	33	30	27	24	22	20	18
78	84	76	70	64	58	53	49	44	40	37	34	31	28	25	23	21
80	92	84	77	70	65	59	54	50	45	41	38	35	32	29	26	24
82	100	92	84	77	71	65	60	55	50	46	42	39	36	33	30	27
84	...	100	92	85	78	72	66	61	55	51	47	43	40	37	34	31
86	...	...	100	92	85	78	72	66	61	56	52	48	44	41	38	35
88	...	...	...	100	92	85	79	73	67	62	57	53	49	45	42	38
90	...	...	...	...	100	92	85	79	73	68	62	58	53	49	46	42
92	...	...	...	...	...	100	93	86	79	73	68	63	58	54	50	47
94	...	...	...	...	...	...	100	93	86	80	74	69	64	59	55	51
96	...	...	...	...	...	...	...	100	93	86	80	74	69	64	60	55
98	...	...	...	...	...	...	...	...	100	93	86	80	75	70	65	60
100	...	...	...	...	...	...	...	...	...	100	93	87	81	75	70	65
102	...	...	...	...	...	...	...	...	...	...	100	93	87	81	75	70
104	...	...	...	...	...	...	...	...	...	...	...	100	93	87	81	76
106	...	...	...	...	...	...	...	...	...	...	...	...	100	93	87	81
108	...	...	...	...	...	...	...	...	...	...	...	...	...	100	93	87
110	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100	94
112	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100

DRY BULB TEMPERATURE °F.

Fig. 2—Portion of a relative humidity chart (standard barometric pressure) showing relative humidities for average ranges of wet and dry bulb readings.

atmosphere with respect to its content of water. This water content varies considerably depending on local conditions.* However, at any given temperature and pressure the maximum amount of water vapor which can be held by a given quantity of air is always the same. When such a quantity of air contains this maximum of water vapor it is said to be saturated. Saturated air can be made to increase its capacity for taking up water vapor by simply increasing the temperature. For example, assuming the pressure to be normal, a pound of dry air at 60°F. can hold a maximum of 0.011 pounds of water vapor. If the temperature be increased by ten degrees, a maximum of 0.016 pounds of water may be taken up—an increase of more than forty-five per cent.

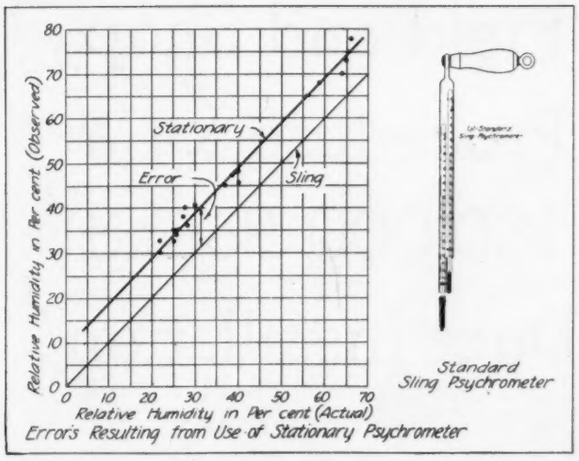
Conversely, air may be made to lose its water vapor capacity by lowering the temperature. If the air temperature is reduced sufficiently to create the condition where any further decrease would precipitate the vapor as water droplets, the dew point is said to have been reached.

Rather than expressing humidity as pounds of water per pound of air, grains of moisture per cubic foot of air, or other absolute units, it has been found more convenient to express it in terms of the amount of water vapor in a given quantity of air in comparison with the maximum amount of water vapor which could be held by the air under the same conditions. This is called the relative humidity and it is expressed as a percentage. For example, saturated air would have a relative humidity of one hundred per cent. If only half the maximum amount of water vapor is present, the relative humidity would be fifty per cent.

The relative humidity varies from as low as twenty per cent, which is the average figure for certain desert areas, to ninety per cent or more.

How Relative Humidity is Measured

Instruments for measuring relative humidity are called hygrometers. (Not to be confused with hydrometers—instruments for measuring the specific gravity of liquids.) The most usual form of hygrometer is the wet-and-dry bulb thermometer, shown in Fig. I. If a thermometer bulb is kept wet by a wick from a reservoir of water, the evaporation of the water from the wick will reduce the temperature somewhat. This lowering of the temperature will depend on the humidity of the air and on the amount of motion of the air near the thermometer. If, therefore, the motion of the air across the thermometer can be made constant, as with a fan, the lowering of the wet bulb thermometer reading will vary in a definite manner with the humidity of the air. The readings of the wet bulb thermometer and a dry bulb thermometer, that is, one not fitted with a wick,



The errors in relative humidities obtained when the wet bulb is not subject to rapidly moving air are shown on the chart. This explains why many "desk' psychrometers fail to read correctly.

may then be used to determine the relative humidity through charts prepared by passing measured quantities of air through a water absorbing agent and weighing the trapped water. Fig. II shows a portion of such a chart.

Fig. III shows another form of hygrometer—the sling psychrometer. This hygrometer is similar to the wet-and-dry bulb thermometer except that the current of air across the wick is obtained by whirling the instrument around in the air rather than through the use of a fan.

How to Prevent "Blush"

It is entirely possible to select solvents and combine them in a lacquer to give excellent resistence to moisture blush even under the worst conditions of temperature and humidity. However, there may be distinct disadvantages in using such materials. The cost may be too high. More important, there may be a sacrifice of working and drying properties of the lacquer. It is usually better, therefore, to approach the problem of moisture blush through control of the humidity in the finishing room.

The ideal procedure for moisture blush control is the complete air conditioning of the room where lacquers are applied. This, of course, involves an expense which is not always warranted since blushing occurs only during a few months of the year, usually the warm and humid summer months. If air conditioning is not feasible there are protective measures which can be taken.

Six Recommendations

Given below are a number of suggestions for preventing and remedying moisture blush.

1. Warm the room in order to reduce the relative humidity of the air.
2. Eliminate all draughts in the vicinity of the work by closing doors and windows and, if necessary, by hanging draught curtains. Movement of air across the wet film will cause faster evaporation of the solvents and have a greater cooling effect.
3. Warm the work either before or after application of the lacquer. If the work is warmed in an oven after finishing, turn off the blower. In this connection it will be found that large heavy work will not blush as easily as light small pieces. The larger pieces do not lose heat as rapidly as do small pieces and consequently cooling is not as rapid.
4. Use a lacquer retarder—a solvent of such properties that some remains in the film until after the temperature has risen above the dewpoint and any moisture which has condensed on the film has evaporated. Depending on the severity of conditions, lacquer retarder is used in concentrations of from five to thirty per cent by volume of the thinned lacquer.
5. Bring all lacquer to room temperature before beginning application. Keep all containers tightly closed.
6. Regularly drain all condensed moisture from air supply lines leading to spray guns.

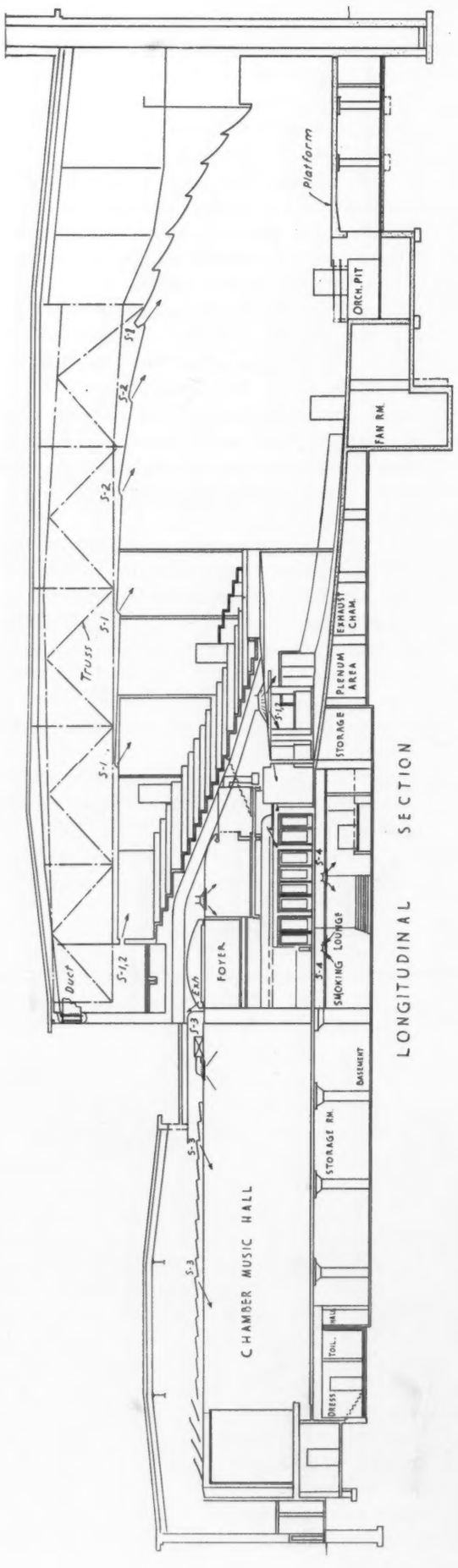
Optimum Drying Conditions

Given below are relative humidities for various temperatures (dry bulb) for good drying of lacquers.

Temperature—°F.	Relative Humidity—%
52	30—41
56	35—45
60	30—39
64	35—43
68	38—46
72	35—42
76	38—45
80	35—41
84	32—37
88	35—42
92	34—39
96	36—41
100	33—38
104	35—39
108	37—41

The problems of finishing products are as numerous as the materials in the products; the type of paint, lacquer or enamel used; the conditions of application and drying in the plant. Since these articles are intended to be practical and useful, your problems are invited. Please send your inquiry to the editors.

Field and Shop Procedure for a 160,000 Pound Duct Installation



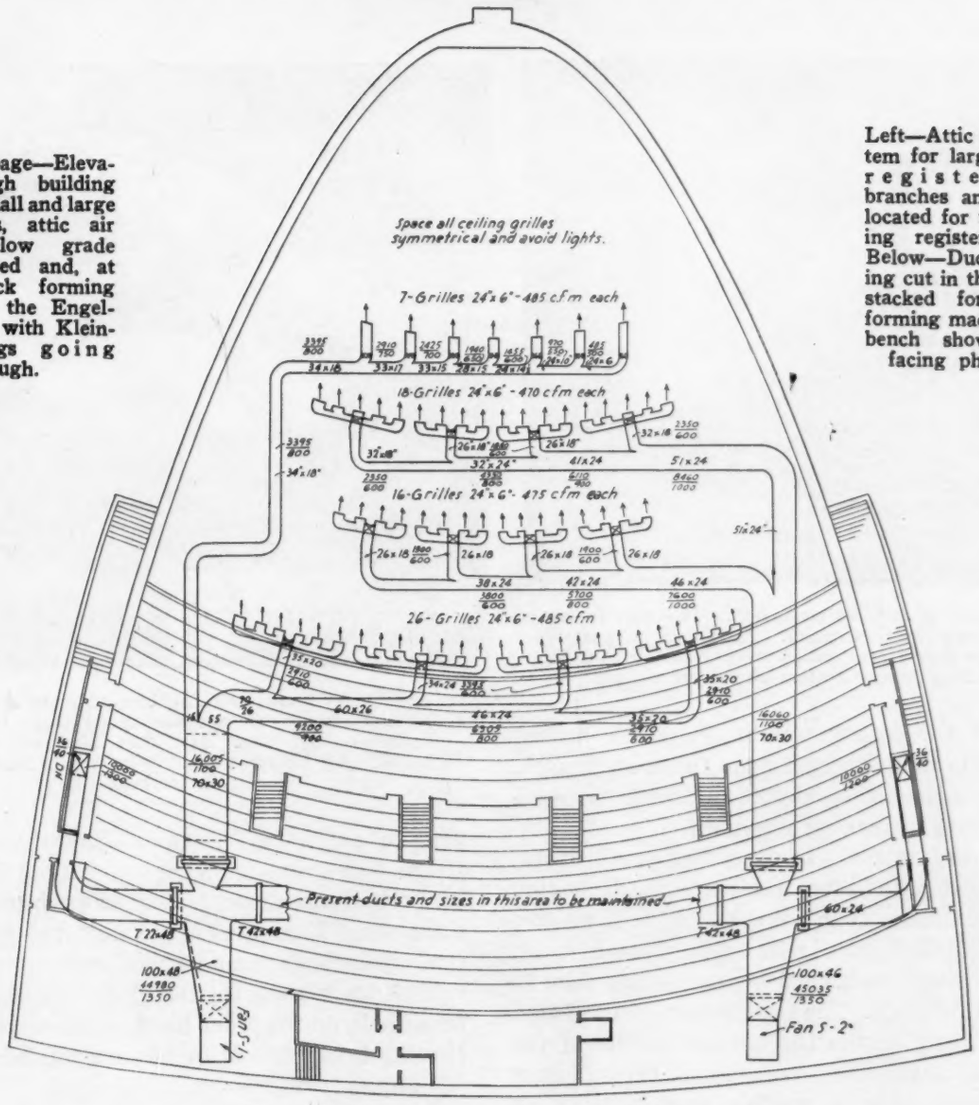
BUFFALO, New York, has a new music hall—a most unusual building—incorporating in its exterior and interior construction and appearance and throughout all its mechanical services advanced ideas of design and the latest equipment for heating, cooling and ventilation.

The building is dedicated to music—music to be presented and enjoyed under the most favorable circumstances. Therefore the building's shape, construction, materials and mechanical services were selected and applied with acoustics uppermost in mind. This placing of acoustics first accounts for the shape of the building, the contours of the ceilings in large and small halls, the very particular design, arrangement and operation of the ventilating system.

The building was given to the city by a Buffalo merchant, Mr. H. J. Kleinhans. Consulting engineer—Clyde R. Place, New York; associate engineers—Beman and Candee, Buffalo; Heating contractor—Quackenbush Co., Buffalo; sheet metal contractor for the ventilating system —Engelhaupt & Co., Buffalo.

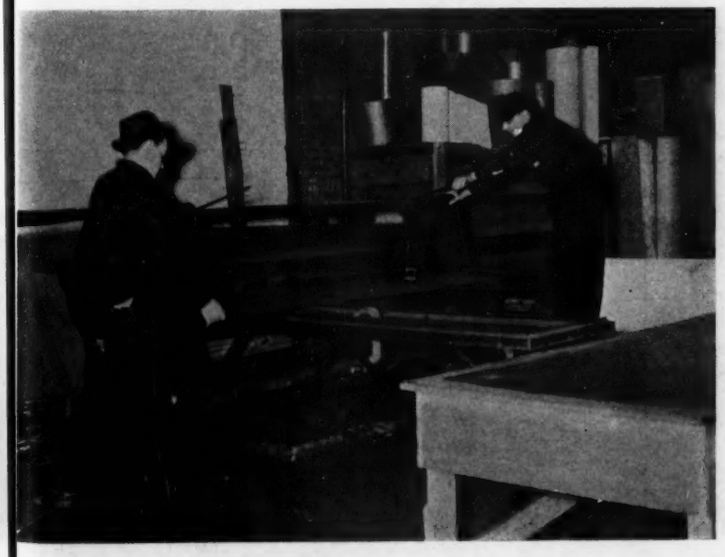
Engelhaupt & Co. fabricated and installed more

On facing page—Elevation through building showing small and large music halls, attic air supply, below grade rooms served and, at bottom, lock forming machine in the Engelhaupt shop with Kleinhans fittings going through.


Space all ceiling grilles symmetrical and avoid lights.
7-Grilles 24"x6"-485 c.f.m. each
18-Grilles 24"x6"-470 c.f.m. each
16-Grilles 24"x6"-475 c.f.m. each
26-Grilles 24"x6"-485 c.f.m.
Present ducts and sizes in this area to be maintained
Fan 5-1
Fan 5-2

Left—Attic supply system for large hall with registers, drops, branches and mains as located for the interesting register locations. Below—Duct pieces being cut in the shear and stacked for the lock forming machine on the bench shown in the facing photograph.

than 160,000 pounds of duct work in the building. The work was under way during last winter—one of the coldest, snowiest, winters Buffalo has seen in twenty years. Despite the problems caused by weather, Engelhaupt scheduled the intricate job and kept the work moving on schedule, except when weather prevented. For example, when the pictures were taken, most of the basement was a huge ice pond, several inches to feet deep, damp and cold, with all sewers frozen solid and basement work at a standstill. When these delays occurred, sheet metal "upstairs" was installed to prevent lost time.



Reproduced are several plans and elevations of the especially interesting and intricate parts of the ventilating system. These drawings and details show clearly the problems of fitting and hanging the ducts and connecting up the duct work to the plenums and equipment in the basement and the attic.

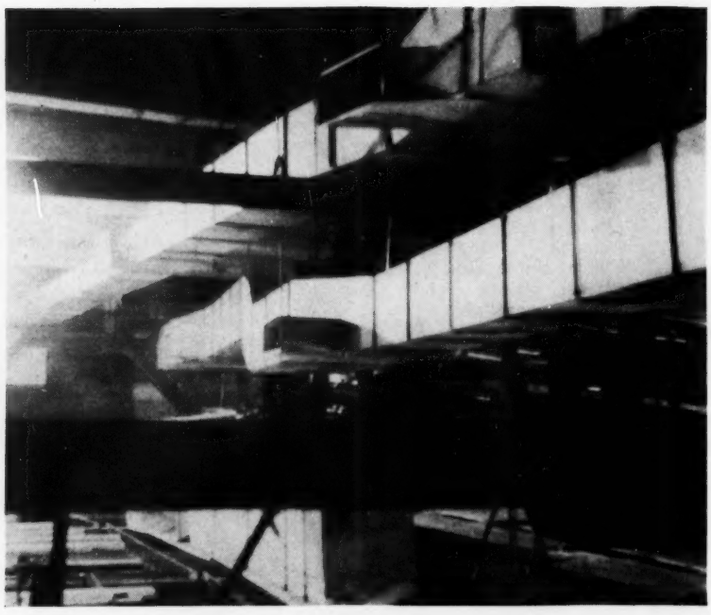
Material used ranged from 16-gauge in equipment housing to 24-gauge in smallest branches. The work naturally divided itself into two major operations—duct work above ceilings in the two music halls; ductwork and housings in the basement.

The ductwork "upstairs," as the elevation through the building and the attic plan of the large hall show, (see also the photographs) is hung through the roof trusses. In the large hall air is introduced through numerous grilles which open through the "step" risers of the ceiling. The

Cross main in attic of large hall. The duct is suspended from roof members. Each section was delivered as four pieces which were assembled on the planking across bottom chords of trusses.

face, in turn, connects with the cross branch through a branch dropped from the cross branch. Mains, cross branches, drops and faces were installed before the ceiling was built.

All of this duct work, excepting small drops, was fabricated in 3-foot sections. Each section was fabricated as four panels—top, bottom, two sides, with Pittsburgh locks on the four corners. A lock forming machine was used in the shop to speed up this work. The panels were hoisted to a plank platform across the bottom chords of the trusses and assembled into sections there. Large ducts (above 30-inch width) were erected as 3-foot sections. Small ducts (under 30-inch width) were assembled into lengths of three to eight sections and the assembly then raised into



Attic main branches being erected from scaffolding. Note transition fittings for drops from branch to register group (see attic duct plan on preceding page). All branches over 30-in. width assembled in 3-ft. sections.

position and hung from movable scaffolding.

The two mains from the two supply fans in the large hall each serve two cross branches—see attic plan. The mains are of uniform size, but the cross branches are continuous tapering ducts with takeoff transitions for the grille branches. In the small hall, on the other hand, cross mains are continuous taper, but branches are tapped out without any transitions.

In all duct work, panels are cross broken. In ducts wider than 30 inches, angle iron stiffeners are riveted between section seams for additional stiffening. Large ducts also have double angle iron stiffeners at all section seams. On smaller ducts, standing seam drive cleats were used at section seams and standing seam, galvanized stiff-

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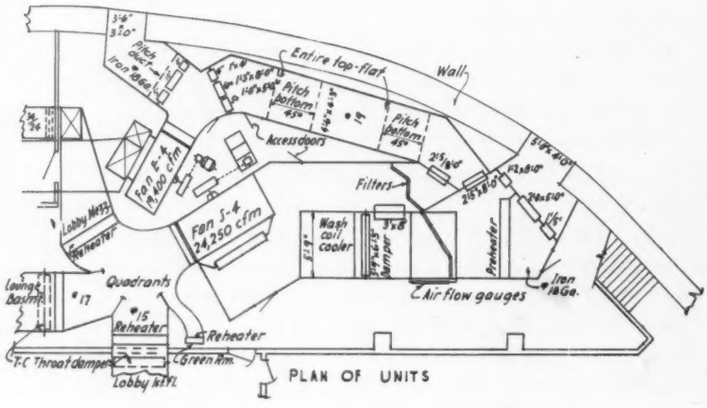
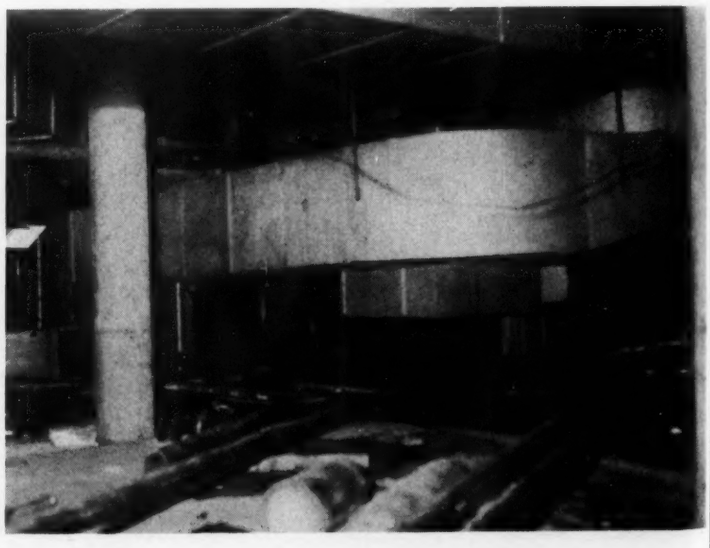
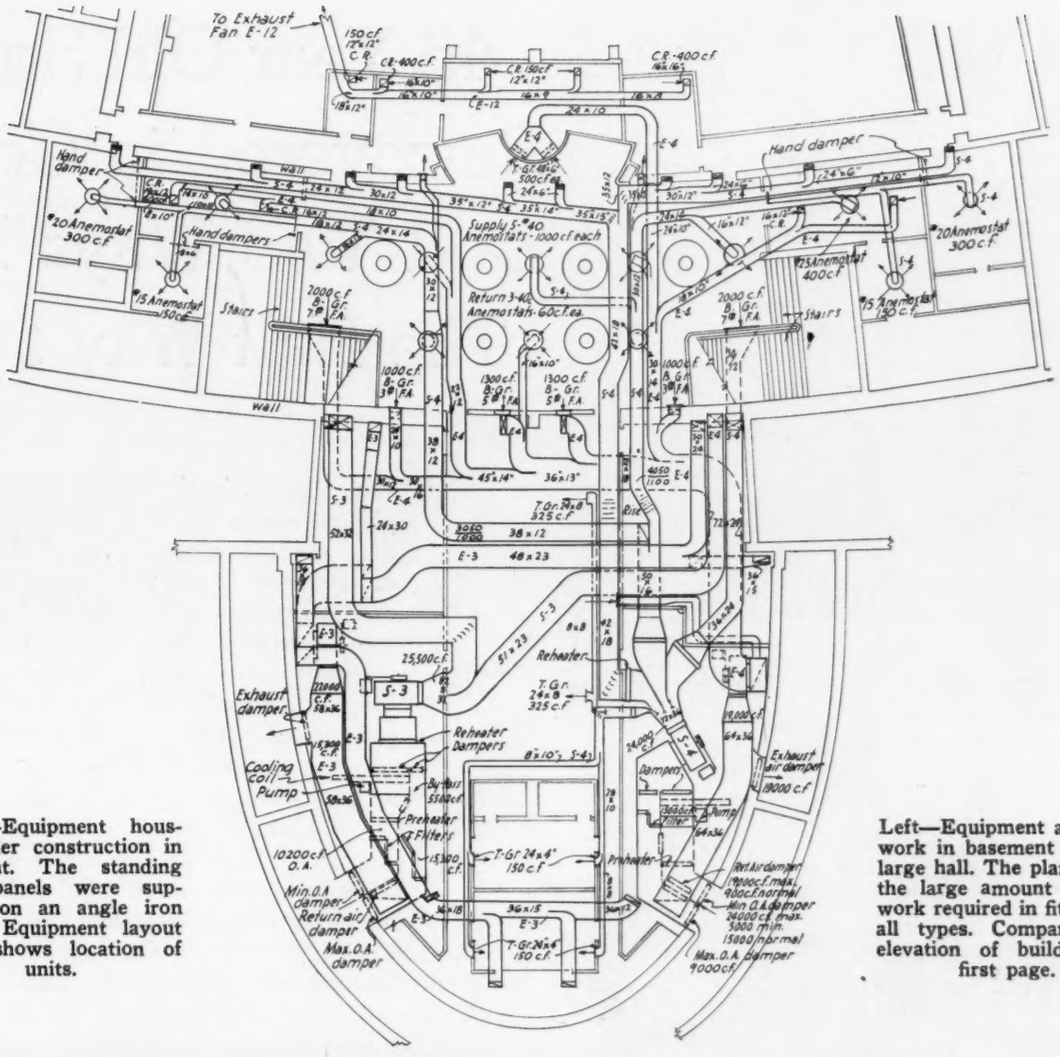
Below, left—Layout of equipment for basement supply fan S-4 and exhaust fan E-4. Below, right—Large supply duct in the basement with equipment (see diagram opposite) in rear.

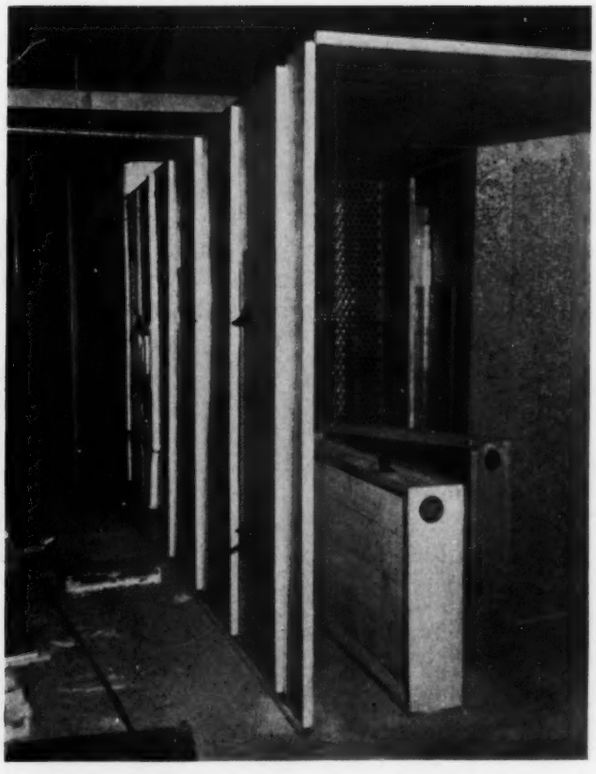






Below—Equipment housing under construction in basement. The standing seam panels were supported on an angle iron frame. Equipment layout above shows location of units.

Left—Equipment and duct work in basement beneath large hall. The plan shows the large amount of duct work required in fittings of all types. Compare with elevation of building on first page.



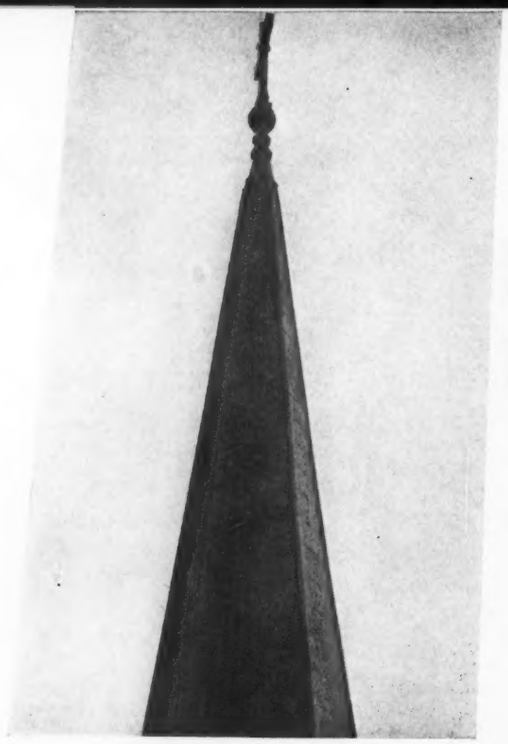
eners were used across the top and bottom—see photograph.

Depending on duct width, angle iron trapeze hangers or galvanized iron straps were used to suspend ducts. All of this ductwork was suspended from steel work.

The sheet metal work in the basement consists of ducts, housings and miscellaneous items as shown in the plan of the large hall basement. Here are located two large supply fans for basement rooms, foyer, small music hall, corridors and numerous other spaces. Here, also, are the exhaust fans for the building. Housings for fans, filters, coils, etc.—both fans in the basement and in the attic were fabricated of 16-gauge sheets assembled on an angle iron framing as shown in one of the photographs. Duct work in the basement is more congested than in the attic, but the same methods were followed as described for attic work. Shop fabrication, construction and erection were identical.

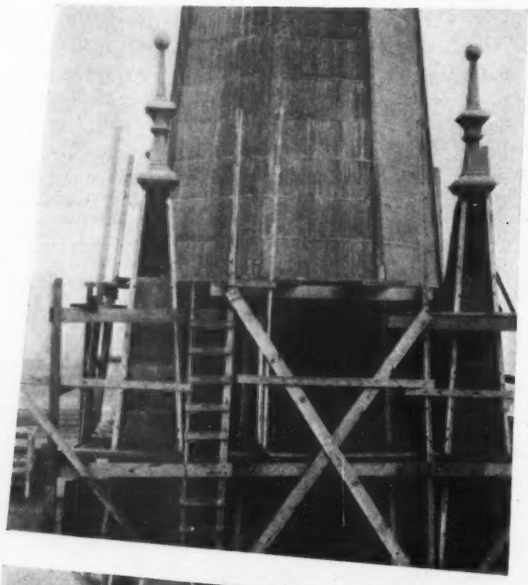
As the plans show, despite the large amount of duct work fabricated, a comparatively small proportion of the work consisted of straight sections.

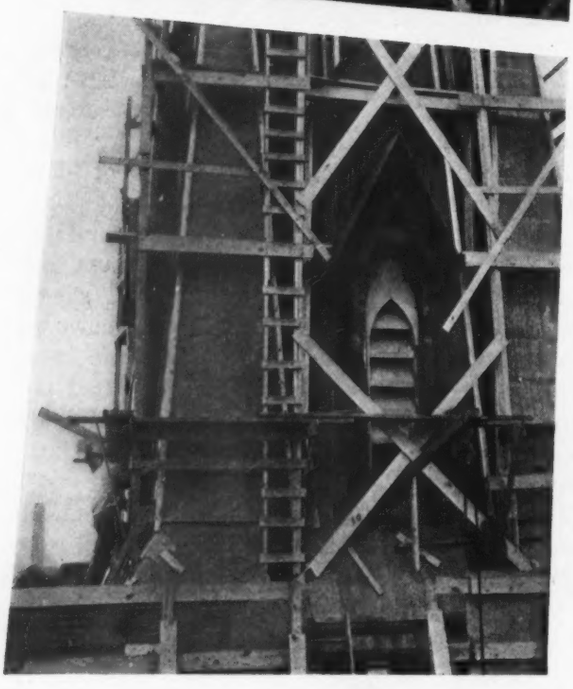
(*Continued on page* 128)



45-Year Old Spires Re-covered in Copper Laid Two Ways From The Half Way Point

The Sheet Metal Section cover picture shows the twin spires under reconstruction. The chief problem was to get the copper on and the copper patina started before the scaffold came down. Two methods were used. Tanner & Co., Indianapolis, furnished 8,000 pounds of copper and helped gather this data.





THE problem which confronted sheet metal contractor Raymond Hausser of Indianapolis was how best to get old slate off and new copper on the twin spires of St. John's Church from scaffolding which had to be removed before the work could be completed.

There seemed to be three possibilities: First, begin to remove slate and lay copper at the top and remove the scaffolding as the work came down. Second, begin at the bottom and remove all slate and apply new copper, omitting sheets where the scaffolding fastened to the spire. Third, remove all slate and begin to lay copper at some mid point and work up from there and begin at the bottom and work up to the mid point and then remove the scaffold, applying missing sheets as the scaffold was taken down.

Method number one was considered, but discarded because the scaffolding was erected and had to be removed by another contractor and it was thought delay might be encountered in getting both jobs synchronized.

Therefore, method number two was used on one spire and method number three on the other.

The spires were covered with slate about 45

◆

Left—Sectional views of one spire during construction with scaffold removed from top half and small spires being covered. On this spire copper was laid from the half point up and the bottom up.

years ago. The slate was beginning to loosen, becoming hazardous; also the appearance of beautiful green patina spires appealed to the church authorities. In addition to the beauty, copper was thought to be more permanent.

Each spire is about 75 feet high and, as the photograph shows, stands on a tall brick tower, placing the cross approximately 175 feet above the street. The scaffolding contractor ran wood beams out the belfry windows and on these beams erected the scaffold as shown in the pictures. The scaffolding is entirely supported on the beams and is only tied into the spires by wire.

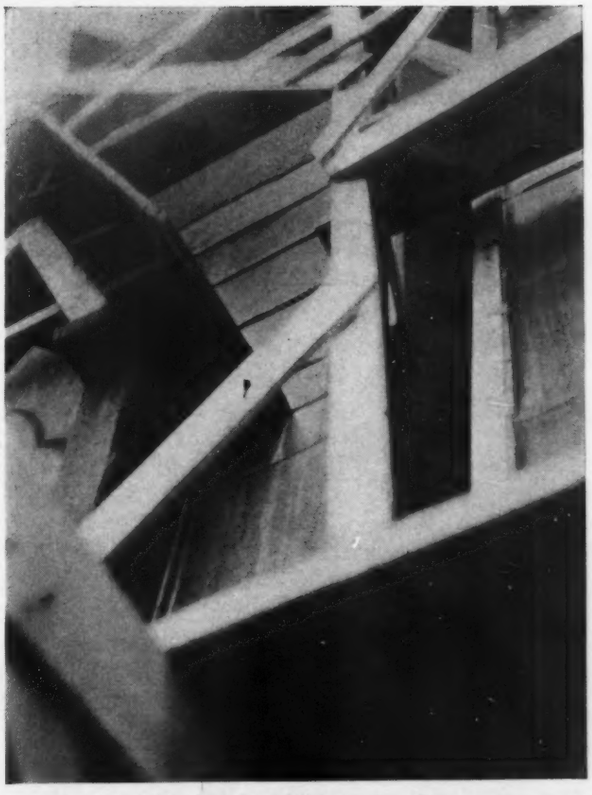
Each spire is eight-sided—about 6 feet wide at the base, tapering to 12 inches at the cross base. Each hip is a heavy batten formed in wood. The space between hips is sheathed in wood, which was found seasoned but sound and so was patched where needed but left in place and covered with dry felt under the copper.

Out-of-Line Hips a Problem

It was found, though, that the hip battens were not evenly lined up, so that in any given course, spaces between each pair of battens would vary so much that each copper course had to be individually measured on the sheathing in order to fit the metal.

This measuring was done with a chalk line on the sheathing. The courses were laid out and chalked and measurements taken the day before so that a full day's material might be ready in time to lay. This method also made it possible to vary the sheet dimensions so that each course fitted snugly along the hips.

The old sheathing was found in good condition but hips much out of line. This meant that every course had to be individually measured with a chalk line before the sheet was cut and formed.



Dormers in the belfry were uncovered and new copper applied. All this part of the job was laid from the bottom up following standard practice.

Caps in 6-foot lengths were made for the hips; the pan sheets adjoining the hips were turned up; cap and pan sheet edge was then double locked as in usual batten construction. No solder was used.

Two Covering Methods Used

There are no vertical seams between battens. The spire was narrow enough, even at the bottom course, so that each pan could be cut from a single sheet. (See photograph.)

On the spire covered by method two (starting in the middle) it was necessary to devise some means whereby sheets could be joined at the horizontal seam while the course above was already in place. This was done by placing cleats in in the first fold of the seam raising the sheet above up off the sheathing, pushing sheet below and cleat up under the sheet above, nailing the cleat and flattening the fold (cleat and two sheets) with the mallet.

On the second spire, where contractor Hausser began at the bottom, usual practice was followed. On both spires sheets, where scaffolding was wired to the sheathing, were put on as the scaffolding came down. The areas around the base, the dormer windows and the small spires were finished after spires above were covered and follow usual practice.

(*Continued on page* 127)

Rules Relating to the Removal of Dust, Gases and Fumes [Part 1]

At the 1940 Wisconsin sheet metal contractors convention, O. T. Nelson, Wisconsin Industrial Commission, discussed blow pipe design and referred several times to rules derived from the regulations of the New York State Department of Labor. This article, and the parts to follow, is the New York law with some minor omissions.

Definitions

RULE 700. "Exhaust system." The term "system" or "exhaust system" shall mean a complete suction device used for the removal of dust, gases, fumes or refuse, including all hoods, pipes, fans, separators and receptacles when required, and any other part necessary for the proper installation and operation thereof, but shall not include any part of the building structure.

"Hood" means that part of the system which is nearest to the point of origin of the dust, gases or fumes and into which the same first enters.

"Pipe" means any piping forming a part of an exhaust system and shall include the following:

1. "Branch" or "branch pipe" means a pipe beginning at the outlet orifice of the hood and extending to and joining the main or submain.
2. "Submain" means a branch of the main pipe to which two or more branch pipes are connected.
3. "Main" or "main pipe" means that part of an exhaust system into which all of the branches and submains join.

"Blast gate" means a sliding damper so arranged that the flow of air through the pipe may be shut off.

"Cleanout door" means a metal door or slide so arranged that access is had to the interior of the pipe for the purpose of cleaning same.

"Separator" means that part of a system in which the refuse is separated from the air and shall include the following:

1. "Cyclone separator" means a separator in which the refuse is separated from the air by means of centrifugal force.
2. "Cloth screen dust arrester" means a separator in which the refuse is separated from the air by filtration through cloth screens.
3. "Dust settling chamber" means a room or chamber provided with baffles in which the dust is separated from the air by means of gravity.
4. "Clarifier" means a separator in which the finest particles of dust are separated from the air, after having passed some other form of separator.
5. "Air filter" means a separator in which the dust is separated from the air by means of impingement.

"Fan" or "exhauster" means the suction device which creates the current of air in the system.

"Refuse receptacle." A box or chamber into which is deposited the refuse from the separator.

"Approved" means approved by the Industrial Board unless otherwise stated.

RULE 704. The amount of static suction as hereinafter required shall be maintained in all branch pipes. Tests for static suction shall be made with a U-shaped water gauge, and the point at which such test is made shall preferably be ten (10) diameters of the pipe from the hood, but in no case less than one (1) foot from the hood or an elbow. It shall be made by placing one end of the rubber tube over a small hole made in the pipe, the other end of the tube being connected to one side of the water gauge. Such test shall be made with all branch pipes open and unobstructed. Other methods of making test may be used subject to the approval of the Commissioner.

RULE 705. Fresh air inlets shall be provided in all workrooms where exhaust systems are located and shall be so located and arranged that the employees are not subjected to a draft of air having a temperature of more than ten (10) degrees below the general temperature of the room or a velocity of more than two hundred and fifty (250) feet per minute.

Recommendation.—It is recommended that air inlets be near the ceiling and air deflected toward ceiling so as to mix with the workroom atmosphere.

RULE 706. In a tenant factory building the owner shall permit the tenant to install the main and branch pipes as required by these rules.

RULE 707. Fire shutters. Whenever a pipe pierces a fire wall, such precautions shall be taken

to prevent the spreading of fire through such pipe or opening provided for same as required by local ordinances, or, if no such ordinances exist, the pipe shall be provided with automatic fire shutters approved by the Commissioner.

RULE 708. All pipes shall be kept free from obstructions and no screens shall be placed in same.

Recommendation.—The use of a trap at the junction of the hood and branch pipe is recommended.

RULE 709. When blast gates are installed they shall be kept open whenever the wheel or machine is in operation. Blast gates of the butterfly valve type shall not be installed.

Recommendation.—It is recommended that all the blast gates be kept open to obtain the highest efficiency in operation of a system.

General Specifications for Piping

RULE 710. The area of the main suction pipe at any point shall be not less than the combined areas of the pipes joining it between such point and the tail end of the system, except that the area of main suction pipe used for removal of dust and refuse created by grinding, polishing and buffing wheels shall be not less than twenty (20) per cent greater than the area of all pipes joining it.

NOTE—The area of floor sweep pipes need not be included in computing main pipe area.

RULE 711. The area of the inlet and outlet of the fan casing and the discharge pipe throughout its entire length shall be at least equal to the area of the main at the fan inlet.

RULE 712. The length of pipe adjacent to the inlet of the fan shall be a split sleeve approximately the same length as the diameter of the pipe but not less than eighteen (18) inches long.

RULE 713. All piping shall be made as short as practicable and with as few bends as possible. Mains, submains and discharge pipes, where possible, shall be not less than six (6) inches above the floor at any point, or six (6) inches below the ceiling at any point.

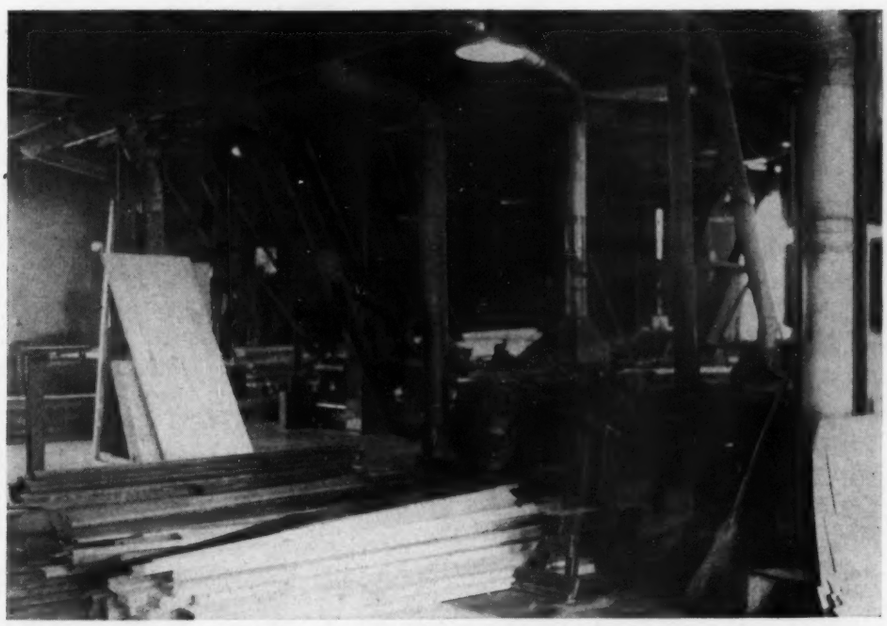
RULE 714. All pipes, except in special cases, shall be constructed of not less than the following gauges of metal:

Size of pipe	U. S. Standard Gauge
Up to 16 inches diameter	No. 24
Over 16 inches to 24 inches diameter	No. 22
Over 24 inches to 34 inches diameter	No. 20
Over 34 inches diameter	No. 18

Other material may be used subject to the approval of the Commissioner.

Where a flexible section of piping is necessary, flexible metal hose may be used. All pipe reinforcing shall be made on the outside of the pipe.

RULE 715. (a) All lap joints shall be so constructed that the outlet of one length of pipe enters the inlet of the next in the direction of the air flow. Pipe sections twelve (12) inches or less in diameter shall be joined with not less than one (1) inch lap; above twelve (12) inches to eighteen (18) inches in diameter shall have not less than one and one-quarter (1¼) inch lap; above eighteen (18) inches to twenty-four (24) inches diameter shall have not less than one and one-half (1½) inch lap; above twenty-four (24) inches in diameter shall have not less than two



Mains, branches, hoods, valves—all must be properly designed and correctly installed if a material removal system is to operate at maximum efficiency and minimum cost. This is a typical wood-working shop installation.

(2) inch lap; all joints and seams shall be either riveted or spot welded and shall also be soldered air tight and edge coated.

(b) Pipe joints of eight (8) inches or less in diameter shall have at least four rivets or spot welds; above eight (8) inches up to twelve (12) inches diameter shall have at least five; above twelve (12) inches up to eighteen (18) inches diameter shall have at least six; above eighteen (18) inches up to twenty-four (24) inches diameter shall have at least seven; above these diameters rivets or spot welds shall be seven to nine inches on centers. Longitudinal seams when lapped shall be either riveted or spot welded not to exceed three (3) inch centers, and shall also be soldered air tight and edge coated.

(c) When locked seams are used, they shall be double locked.

RULE 716. Every branch pipe, except in special cases, shall be connected to the main pipe at the top or side and at an angle not exceeding forty-five (45) degrees; it shall incline in the direction of the air flow at junction with main. Branch pipes shall not project into main.

Recommendation. — Branch pipes should junction with the main in the tapered sections as close as practicable to larger end of sections.

RULE 717. Every branch pipe shall lead out of hood as nearly as possible at the point where the dust will naturally be thrown into it by the wheel or cutting tool.

RULE 718. Every enlargement in the size of pipe shall be made on a taper and not by an abrupt change.

RULE 719. All slip joints into which pipes of smaller diameters telescope shall have a reinforcing band on the outside of the larger member and shall be free from burrs, projections and sharp edges.

RULE 720. (a) Unless space will not permit every bend, turn or elbow shall be made with a center line radius at least equal to twice the diameter of the pipe to which it is connected.

(b) All ninety degree bends or elbows six (6) inches or less in diameter shall be made of not less than five (5) pieces or sections. All ninety degree bends or elbows more than six (6) inches in diameter shall be made of not less than seven pieces or sections. Obtuse angles, bends or elbows shall be pieced proportionately.

RULE 721. All pipes shall be supported with strap iron, angle iron, band iron or wire at intervals not to exceed twelve (12) feet.

RULE 722. Clean-out doors. All horizontal suction pipes shall be provided with clean-out doors spaced not more than ten (10) feet apart.

RULE 723. In future installations the main suction pipe and sub-mains shall be blanked off at the tail end with removable caps and the last branch connections shall not be more than six (6) inches from the capped end.

RULE 724. If an adjustable gate or other device is placed in the branch pipes for the purpose of equalizing the air flow, it shall be as close as practicable to its junction with the main. In no case shall such a device be installed until the location and design is approved by the Commissioner. Such a device shall not be considered an obstruction. A clean out door shall be placed in the branch near equalizer.

General Specifications for Hoods

RULE 725. Every hood shall be made of galvanized steel or other material subject to the approval of the Commissioner.

RULE 726. Every hood shall be so designed and located that the dust, gases or fumes will fall, be projected or drawn into the hood in the direction of the air flow.

In the case of dust, gases, fumes, vapors, fibres, and other impurities generated or released by machines or processes of manufacture enumerated in Rules 740, 741 and 745, the Commissioner will advise with the owner or his authorized agent as to the design of hoods.

RULE 727. Hoods shall be made of metal at least two gauges heavier than the pipes to which they are connected. The inside diameter of the pipe or elbows connected to the collars on hoods shall be the pipe sizes and the collars on the hood shall fit tightly into such connecting pipes or elbows without clearance.

RULE 728. All hoods shall be kept free from burrs and sharp edges. Large hoods shall be sufficiently reinforced to maintain their shape.

RULE 729. Telescopic joints used on adjustable hoods shall be of sliding fit.

General Specifications for Separators

RULE 730. The air outlet from every separator shall discharge to the outside atmosphere, except when an approved separator is used which effectually removes all dust from the air, but in no case shall any separator used for the removal of lead dusts or lead fumes discharge into any workroom except on approval by the Commissioner. The point of discharge from any separator shall be located so that the discharge therefrom will not enter any window, door or other opening of any factory or mercantile establishment.

Suitable refuse receptacles devoid of air under pressure shall be provided for the refuse discharge from separators.

Recommendation. — Structural members of the building should be carefully examined and reinforced if necessary, to safely support the separator when fully loaded.

[To be continued]

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Above: Testing samples of steel to be used in making Crestoloy Wrenches.

Below: Any departure from specifications is quickly caught by tests like this one, made on individual parts before assembly.

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BOOKKEEPING—

A Plan of Accounts

By Joseph G. Dingle, C. P. A. Ottawa, Ill.

IN our preceding articles we have discussed some of the fundamental things pertaining to your business. We have tried to impress upon you the need for understanding the so-called "technical terms" of bookkeeping; we have tried to give you a simple, yet comprehensive, definition of business; we have tried to point out that your money is all over the place, in many varied forms and even in intangibles; and last month we stressed some of the "little things in business," believing that it is the attention to these little things that makes for greater success. We hope we have succeeded in helping you realize that, no matter whether your business is large or small, it is your business and its success or failure is wholly up to you. We now want to give you interesting and, we hope, instructive reading on the matter of actual bookkeeping; its purpose; its value; and its results.

Bookkeeping Must Be Systematised

When it comes to the layout of your shop, you know what you want, because there you will work. You know something of the convenience of a well planned shop, with work benches at the proper place. You know you need certain machine tools, certain hand tools, etc. For the layout of your bookkeeping you should plan even more carefully. In the shop, you will constantly be observing the convenience or inconvenience of some particular arrangement. You will constantly feel the need of some missing piece of equipment. But when it comes to your bookkeeping system, you will not be so closely in touch with the day-to-day operations and, if you are like a great many business men, you will realize too late that certain information should have been segregated as you went along. Some information, unless gathered day by day as it develops, is utterly lost. As we have stressed in an earlier article, business is like a huge mixing bowl, and just as you put labor, materials and supplies together to make a completed article, and then add a measure of overhead to arrive at the price, your bookkeeping system should be so arranged as to record as the work actually progresses in the shop the elements of labor, materials, supplies and overhead as they go into the mixing process. The more closely your bookkeeping practice follows your shop practice, the better the record will be and the more easily you can understand the cost figures thus produced.

Whether your business is large or small, you own certain classes or kinds of property. You owe debts of several kinds. You will sell materials or services, or both. You have expenses of many kinds. In bookkeeping terms, we speak of the things you own as "Assets"; the debts you owe to others as "Liabilities"; the sales are "Income" and the expenses are "Expenses." While it is possible to dump all data pertaining to the things you own in one place, or account, the result would be practically worthless. To intelligently operate a business, one must know what money he has in the office and in the bank; what accounts are due him from his customers; what he has in the way of materials, supplies, etc., and what he has invested in equipment. He must also know what debts he owes and when they are due.

Ledgers, Journals, Etc.

To accomplish these purposes, the information is recorded in accounts, properly named to indicate what class of information is therein recorded, and these accounts, being separate sheets properly ruled and printed for the purposes, are kept in a binder called the ledger. Their use may be compared to the use of the bins in the shop. Upon receiving a shipment of sheets, they are carefully placed in the proper racks, each size or gauge to itself, and you will admit that this is for the purpose of enabling you to more easily find the particular size desired for use. Upon a transaction taking place, the information pertaining to the moving of value from one place to another (and that is just what a business transaction is) is recorded in the accounts affected. You have moved value from, let us say, the bank, and placed that value in material. In other words, you have drawn a check to pay for a cash purchase of some material. You have less money

in the bank and more money in material. The bookkeeper must so record this moving of value by crediting the source—the bank account; and debiting the disposition—Material account. The entry having been made, the two accounts will reflect the transaction, and each account will properly show the new amount or money in each, or, as we say in bookkeeping, each account will show its new and correct balance.

Accounts Must Be "Orderly"

Having thus explained the need for an intelligent classification of your assets, your liabilities, your income and your expense, we are now ready to offer for your consideration the accounts which, in our opinion, will properly classify your business activities, and this list of accounts, under the major classifications of Assets, Liabilities, Income and Expense, is called a "Chart of Accounts." In other words, these "accounts" are each on a separate sheet, called a "ledger sheet," and the sheets are put into a binder, and the whole is called the "Ledger." For the purpose of better illustrating this concept of an "account," we here show a typical ledger sheet. In speaking of a particular account, as we shall now proceed to do, it is necessary for you to see one of these ledger sheets with the name of that account written in the place provided therefor, and on that ledger sheet will be written the information, in dollars and cents, with the date and the source of the entry shown in the conventional manner. The mechanics of recording this data will be discussed later, but here we wish to discuss the individual accounts; the places to which and from which your business operations will be moving value. A thorough understanding of the separate accounts is essential to the appreciation of a good bookkeeping system. The system is no better than the information it will produce in usable form, and it is admittedly better to so segregate the transactions as they occur into usable form than it is to try to dig it out at some later date.

Assets

1—CASH IN OFFICE. This account name fully explains the purpose of the account. It is to contain all transactions with cash in the office. It will at all times show the amount of cash you have in the office, and all receipts and disbursements of cash in the office will ultimately be recorded here. During the day, you will perhaps collect varying amounts from several customers. That transaction is the actual moving of a certain amount of money from a customer (an account receivable) into your cash drawer. You will sooner or later take that cash to the bank. That transaction will be recorded to show that you have taken the cash from the office to the bank.

2—BANK. This account, as its name implies, is for the purpose of containing all transactions with the bank. You make deposits and draw checks on the bank. The transactions thus had will be recorded in this account, and the balance remaining in the bank will be determinable at all times.

3—ACCOUNTS RECEIVABLE. As indicated by this account name, it is to contain the amount of the accounts "receivable by you" from your customers. The original entries to this account will come from the sales record, whereby you charge the customers for the value of the merchandise, etc., which they receive, and as they pay the account, they will receive credit for the amount paid, or, if there be a return of all or a part of the merchandise, or a reduction in the price, due to an allowance, that entry will also be recorded here, thus bringing the amount of the account to the correct amount due to you by the customer. While this is but a single account, dealing with the transactions you have with all your customers, it will be supported and amplified by separate accounts with each and every customer, and the total due to you by all customers will be here shown as a total, and in the indi-

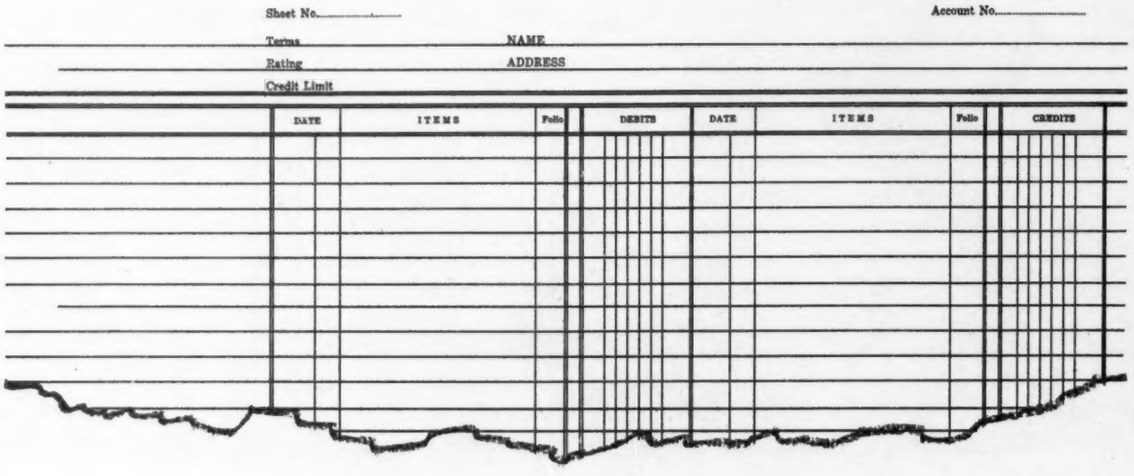


CHART OF ACCOUNTS

ASSETS

1—Cash in Office
2—Bank (Name)
3—Accounts Receivable
4—Notes Receivable
5—Investments
6—Inventory—Materials
7—Inventory—Appliances
8—Inventory—Supplies
9—Consigned Merchandise
10—Work in Process

21—Building
22—Machinery & Equipment
23—Delivery Equipment
24—Furniture & Fixtures

31—Proprietor's Drawing Account (Or Partners' Drawing Accounts)

41—Deposits—Franchise
42—Prepaid Insurance

EXPENSES

141—Advertising
142—Bad Debts
143—Collection Expense
144—Discount Allowed
145—Delivery Expense
146—Depreciation
147—Dues & Subscriptions
148—Freight & Drayage
149—Heat, Light & Water
150—Interest Paid
151—Insurance—Fire
152—Insurance—Liability
153—Insurance—Workmen's Comp.
154—Indirect Labor
155—Machine & Tool Expense
156—Office Expense
157—Rent
158—Repairs—Delivery Equipment
159—Repairs—Shop
160—Salaries—Office
161—Salaries—Selling
162—Selling Expense
163—Supplies Used
164—Taxes—Real Estate & Personal
165—Taxes—Income
166—Taxes—Old Age Benefits
167—Taxes—Unemployment Comp.
168—Telephone & Telegraph
169—Travelling Expense

LIABILITIES

51—Accounts Payable
52—Notes Payable
53—Notes Receivable Discounted
54—Consignment

61—Accrued Wages
62—Accrued Taxes—Real Estate & Personal
63—Accrued Taxes—Old Age Benefits
64—Accrued Taxes—Unemploy. Comp. Federal
65—Accrued Taxes—Unemploy. Comp. State
66—Accrued Interest
67—Accrued Workmen's Comp. Insurance

71—Reserve for Depreciation—Building
72—Reserve for Depreciation—Mchy. & Equip.
73—Reserve for Depreciation—Del. Equip.
74—Reserve for Depreciation—Furn & Fixt.

CAPITAL ACCOUNT (Or Accounts)

81—One account, if individually owned; Separate accounts for each partner if a partnership; Capital Stock and Surplus, if Corporation

INCOME ACCOUNTS

101—Sales of Material
102—Sales of Labor
103—Sales of Appliances
104—Sales of Appliances, Wholesale

111—Returns & Allowances—Material
112—Returns & Allowances—Labor
113—Returns & Allowances—Appliances
114—Returns & Allowances—Appliances, Wholesale

121—Cost of Sales—Material
122—Cost of Sales—Labor
123—Cost of Sales—Appliances
124—Cost of Sales—Appliances, Wholesale

131—Discount Taken
132—Interest Earned
133—Commissions Earned

vidual accounts with customers you will have the detailed data as to just who owes you and how much—the total of all these individual accounts being equal to the balance carried in this Accounts Receivable Account.

The real value of this account to the management is in the fact that it furnishes a total of all unpaid customers' accounts. The older a customer's account becomes, the harder it is to collect. Again, too many business men find themselves short of working capital when they allow their accounts receivable to consume too much of their funds. Watch the collection of your accounts receivable.

4—NOTES RECEIVABLE. It is often necessary, or advisable, to close an accounts receivable with a note, and when that is done, the bookkeeper will record that act by transferring the amount of the account from Accounts Receivable to Notes Receivable. After this transaction has been so recorded, payments made on the note will be credited to Notes Receivable, to in-

dicate the reduction in the amount owed to the business on notes receivable.

Provide a suitable and safe place to keep any notes receivable and see that the makers are notified a few days before the note matures. This will materially aid in the collection of the note.

5—INVESTMENTS. This account is provided for the purpose of recording the cost of any investments in stocks, bonds, etc., which may be used for the purpose of obtaining a return for any surplus funds owned but not required in the business at the time. This may sound rather funny just now, but there have been times when even a little shop owner had some surplus funds in his business. That has not been a common condition, however, for quite some years. We hope it will come again in the near future. If you do have any investments, provide a secure place for their keeping, and be sure your bookkeeper is informed of any income therefrom, also of any transactions, either sale or purchase.

6—INVENTORY — MATERIALS. This account, as its name implies, is to contain the cost of the materials purchased. Materials, as here used, are those commodities which are purchased for use in the fabrication of salable articles, as differentiating from Supplies and Appliances, for which separate inventory accounts are provided. This account will be charged as materials are purchased, and will be credited to show the transfer of the merchandise into operations—through Work in Process—or into cost of sales, if sold as it was bought. Watch your inventories. It is necessary that you have on hand such material as is ordinarily used. Do not overstock. Money tied up in overstocked inventory is not usable for other purposes.

7—INVENTORY—APPLIANCES. This is a new account, not included in our Chart of Accounts in 1930, and is to be used to contain the cost of such appliances, or complete units as are purchased and sold in the condition of a completed unit. To illustrate, you purchase an air conditioning unit which may be sold in the condition in which it was purchased, with little or no installation. Such an object should be kept separate from the materials which are used in the fabrication of salable objects, for the particular reason that such appliances are usually sold at the manufacturer's advertised price, and the gross profit realized on the sale may differ quite substantially from that obtained from the sale of articles fabricated by you. As will be seen, in the chart of accounts under Income, sales, cost of sales, and returns and allowances accounts have been provided for the transactions in appliances, separate from the sales of materials. If you have the facilities for properly displaying appliances, you will find such a display quite helpful in sales work, but a few shops fail to appreciate this fact. Make your display room attractive; keep it clean and inviting; and watch it produce results.

8—INVENTORY—SUPPLIES. This inventory account will contain the cost of shop supplies, and such articles as are used in the fabrication of salable objects, but, unlike materials, are not charged directly against the cost of the job. Several items which will appear in this account are rivets, bolts, solder, etc.

9—CONSIGNED MERCHANDISE. With the changing business of the sheet metal shop, we find some manufacturers of appliances placing the goods on consignment with the dealers. This method of doing business is quite different from a technical standpoint from the older method of purchase. This Consigned Merchandise account is provided for the purpose of enabling the shop owner to show separately the merchandise in his shop which is not owned by him, but there on consignment. Upon receipt of a shipment of consigned merchandise, the bookkeeper should charge this account, and credit "Consignment Account" which appears under Liabilities in the chart of accounts. When all or a part of the consigned merchandise is sold, the bookkeeper should charge "Consignment Account" and credit "Consigned Merchandise" with the value of such consigned merchandise; thus bringing both accounts into agreement with the facts as to the remaining consigned merchandise. Upon sale of consigned merchandise, the shop must then purchase the merchandise thus sold, and the transaction is thus recorded as a purchase, charging Inventory—Appliances, or Cost of Appliances Sold, as the case may be. By this segregation of Consigned Merchandise in a separate account, the shop owner can better protect himself and the manufacturer in the matter of fire insurance, if he assumes responsibility for such merchandise as is in his possession.

10—WORK IN PROCESS. This is the real mixing pot of the whole set of accounts. We have frequently called "business" a mixing process whereby materials, labor and expenses are put together in order to produce a salable object. This Work in Process account is provided for the purpose of receiving the cost of the materials put into process, the cost of the labor so used, and any supplies directly applicable to a specific job. Many jobs are in process at all times, and as the time reports and material tickets come to the office, showing the expenditure of money for these jobs, the bookkeeper will charge this account; post the items to the proper Job Cost Tickets, and at all times be able to show by job cost tickets the amount of money represented by the jobs in process at any given moment of time. As jobs

(Continued on page 122)

Specifications Observing Industry Practice Recommended to Nat'l Defense Commission

By George Boeddener

Managing Director, N. W. A. H. & A. C. Assn.

A MEETING of the Plumbing, Heating and Allied Industries Advisory Committee was held Sept. 12 in Washington, D. C. This Committee was formed at the suggestion of the Construction Division of the National Defense Commission, at a meeting held in Cleveland on September 5th. Approximately sixteen industries are represented in this group including various divisions of the plumbing, pipe and fittings, boiler and radiator and, warm air furnace industries. This meeting was attended by Messrs. Olsen, Denges, Boeddener, representing the N. W. A. H. & A. C. Association.

The purpose of the meeting was to bring about a clarification insofar as possible, of the procedure and construction requirements of the Army and Navy with reference to Army Camps and Navy Bases. Based on information developed at this meeting, it would seem that henceforth all of the construction required for various Army Camps will be awarded on a fee plus basis to general contractors to expedite the building of these camps.

As the industry probably knows, a wide variety of buildings are included in each camp, as for instance, store houses, men barracks, officers quarters and mess, regimental administration, fire house, post exchange, recreation buildings, etc. With very few exceptions all of the buildings will be heated with forced warm air units for use with either coal, gas, or oil, depending upon the location of the camps. The determination as to which fuel will be used will be governed by the cost of the fuel available in the particular camp locations. Of the wide variety of buildings erected in each camp the most numerous ones are for men barracks, the percentage of men barracks for each camp representing about 80 per cent of the total number of buildings.

In checking over the War Department's general specifications and plans it was the committee's thought to detect any items which were not standard in the industry and which therefore would hold up delivery of the installed heating equipment.

Subsequently two members of the committee returned to Washington on Sept. 18 for a meeting with the Construction Division of the Defense Commission and the War Department and presented specifications covering forced warm air heating systems and revisions which correspond to industry practice. These revisions are specifically set forth in the cover letter to W. V. Kahler of the Defense Commission. These revisions are as follows:

"As suggested at the meeting of the Plumbing, Heating and Allied Industries Advisory Committee in Washington last week, the Warm Air Industry, through its Association, has made a careful survey of the existing War Department specifications covering forced warm air heating. We have prepared a set of suggested specifications in which a number of items have been revised to enable our Industry to supply standard equipment which will materially aid the Government in securing heating systems in the time which has been allotted. The changes which have been made in the specifications and the reasons for suggesting these changes are as follows:

Furnace or Heat Exchanger

"The words 'an improved insulated' which pertains to the furnace casing have been omitted, since all standard furnaces are manufactured with an air space insulation which has proven very satisfactory through many years, and it is felt that these words might be confusing in that they may indicate something special, whereas we believe that this is not the intent. We have also omitted the section of this paragraph requiring a written 10-year guarantee, inasmuch as this is not standard practice within the Industry, and have changed this to conform with the more recent specification issued on September 10 calling for units to be used at Camp Falmouth, and in which it is stated that the materials used in the heat exchanger shall be consistent with an expected life of ten years. In making this change it will permit the entire industry to supply equipment rather than a few who might be willing to issue a written 10-year guarantee. Also, in this paragraph we have suggested that the gauge metal required for the furnace casings be revised to 24 gauge for rectangular casing and 26 gauge for round casing. This is consistent with commercial practice and the fact that these gauges have been used for a number of years has proven to the Industry that it does not materially reduce the life of the casing from that which might be secured if a heavier gauge were used.

"Within the Industry there is now a substantial stock of this metal available, whereas if heavier gauges are required, it will be necessary that the material be purchased, and at the present time sheet mills can only promise deliveries from four to six weeks.

Grates

"In this paragraph we have eliminated the provision for a device which will indicate the exact position of the

grates. To our knowledge such a device is not manufactured by any one in the Industry, and in addition, it is felt that such a device is unnecessary, since after the unit is operated the fireman will become acquainted with the relation between the position of the grates and the position of the shaking levers.

Electric Motor

"We suggest the omission of the words 'totally enclosed' which applies to the supply fan motor, inasmuch as this is not a standard type motor which can be readily secured in large quantities and, further, we are informed by the motor manufacturers that such a motor is not suitable for blower application.

Humidifier

"Here we have substituted copper tubing, or galvanized pipe in place of the flat specification for galvanized steel pipe, inasmuch as most all standard packages of humidifier equipment are supplied with copper tubing and fittings, which we feel confident will give as good service as the material specified and permit immediate purchase of this equipment.

Controls

"The word 'combination' has been added as it applies to the high limit bonnet thermostat and the low limit bonnet thermostat, since one control will perform the same function as two, and further, will reduce the cost of the controls and the installation.

Smoke Pipe

"First item in this paragraph in which we suggest a change in the gauge of the material required. No. 14 gauge is now specified. However, this material is difficult to secure at the present time, and further, smoke pipe of this gauge must be hand made. We have suggested 22 gauge inasmuch as this can be made with the machinery available within the Industry, and it is one gauge heavier than standard smoke pipe which has been used for many years. The material required for the smoke pipe, according to the specifications, must be copper bearing or copper molybdenum iron, and we have omitted this requirement, since we learn from a number of the mills that this type of iron is a special and only represents about 5% of their total production. To secure the type of iron specified, it would mean a delay of several weeks in the securing of such material. In eliminating this requirement, we have also omitted the chart outlining the properties of the metal.

Duct Work

"We suggest a change in the requirement of elbow radiuses from 1½ times the width of the duct to ½ times the width of the duct. Our reason for doing so is that within the Industry there is a tremendous potential production for prefabricated ducts and fittings, the use of which we believe would materially aid in this program.

"Have also omitted in this paragraph the requirement of copper or nickel alloy iron for the same reasons as outlined previously.

"We have made further changes in this paragraph in omitting the requirement that trade name of the manufacturer and gauge of metal be stamped on each sheet, as it would be impossible to comply with this requirement if prefabricated duct is used. The gauges of the metal required have been revised to conform with Industry practice with nothing heavier than 22 gauge, and to permit the use of prefabricated duct if so desired, and further, by requiring standard gauges, it will permit the use of materials now in stock rather than to secure them from the mills, which would cause considerable delay.

Canvas Connections

"We have omitted requirement that canvas connections shall be dipped in rubber, since this requires special material, and all blower equipment now in stocks include canvas connection, which the Industry has used as standard and which we believe will give the same performance as that which is specified.

Painting

"We have recommended that the following paragraph be omitted—

"(See U. S. Army Specifications Nos. 3-1 and 3-49 and Federal Specifications Nos. TT-R-191, TT-V-51 and TT-V-121.) The smoke connections between the furnaces and the stacks shall be thoroughly cleaned inside and outside, and given one (1) coat of red lead and two (2) coats of black graphite paint. Pipe hangers, duct hangers, etc., and all other iron work that is not covered or otherwise finished, shall be given one (1) coat of best quality asphaltum varnish. The fan motors shall be rubbed down and given two (2) coats of approved lead and oil paint and one (1) coat of spar varnish. The painting of all exposed piping, ducts, grilles, etc., shall be as specified under another section of this specification, or as directed by the C. Q. M.

"There are two other factors which cannot be handled in these general specifications, but we shall appreciate it if they are given consideration when the specifications are drawn for each individual job.

"First, the Warm Air Heating Industry is in better position to supply furnaces of standard sizes because they lend better to mechanized production than some of the large special units which have been specified. These large units are on a limited production basis, and in the majority of instances must be hand made. Although we do not anticipate that there will be any immediate difficulty in securing such units, there is the possibility that as the demand grows, the present production facilities will not be adequate to serve the Government's requirements. We feel, therefore, that such a situation could definitely be avoided if at this time a provision were written into the specifications as an alternate permitting the use of two standard size furnaces under a battery cap instead of one large unit.

"We also believe that the vast facilities within the Industry for manufacturing ducts and fittings should be utilized in order that this program may be carried out as anticipated, and we therefore suggest that either in the specifications under duct work or as an alternate that the bidder be permitted to change the sizes of the ducts outlined on the plans to conform with standard sizes manufactured by the industry, provided that the free area of the duct or the operating efficiency of the system is not reduced.

"Our Industry is extremely anxious to cooperate to its fullest extent in the National Defense Program, and we shall appreciate any consideration given to these suggestions, as we believe they will be beneficial to all parties concerned.

"We wish to thank you for the opportunity you have given us to submit this material through Mr. George Hoffman, Chairman of the Plumbing, Heating and Allied Industries Advisory Committee, and we stand ready to do everytihng possible for the advancement of the National Defense Program."

As this issue goes to press we do not know whether these recommendations have been approved. However, we call readers' attention to the editorial on page 37 which outlines a situation and a suggested procedure in which every reader can assist. If you want to help, write us, or Mr. George Boeddener, author of this report.

"Streamlined" Sheet Metal Training For National Defense Needs

By Ernest E. Zideck

Instructor, Technical School, Jackson, Michigan

AT a conference of one hundred and fifty vocational teachers from all parts of Michigan, held at Allegan, August 3 and 4, in which participated the respective heads of the Lansing agencies functioning under the National Defense Council, it was brought out that in the sheet metal trade for one, certain departures from the orthodox teaching of the trade must be made to render the trainee of immediate value to industry, or enable the student to step out of training at any time in the future and enter, as a valuable worker, any industry in which workers in sheet metal may be needed.

Under such industries may be classed, by about thirty per cent, contracting firms doing sheet metal work in connection with the erection of military barracks and stores; additions to factories; industrial sheet metal work in connection; heating-ventilating of the buildings; air conditioning and all other such sheet metal work applying to buildings for occupancy by the military or in which supplies for the military are manufactured or handled.

But the greater need for men trained in one or the other phase of sheet metal work will ensue, especially in the course of a draft for service in the active defense forces, in factories building military craft and planes. At that, the skilled men active in such industry at present are men over 45 and in many cases over 55 years of age. These men may drop out any time. In this National Defense emergency the program

Young men trained in one or more of the six operations suggested by the author can quickly become useful in many lines of rearmament work. These young men were trained in a WPA project. (Photo by International Nickel Co.)

calls for great numbers of the now unemployed younger men to be trained quickly in a specialized work in replacement of the draftees and the over-aged.

Six Operations Can Be Taught Quickly

In the sheet metal line of work, the specialized operations which may be learned in a comparatively short time are:

1. The operation of the Square Shears in all its particulars.
2. The operation of the Brake in all its phases;
3. Hand-flanging over forms;
4. The making of templates for use in tool and die work and in the fabrication of parts for vehicles and aircraft;
5. The construction of air ducts and their installation;
6. Soldering in the construction of liquid radiators.

One, two and five could be introduced advantageously in the legitimate sheet metal trade, especially on large jobs.

One, two, three and four are already being employed to advantage in factories. And six is conditional, depending on the construction of the radiators that will be used on military transports and planes.

Students Will Not Be Full Mechanics

It takes four years of full-time training to produce a full-fledged, all-around sheet metal worker. It takes at least two years full-time employment in a shop to produce a good helper and a partially independent worker. Any part-time training in a class room, where the orthodox all-around instruction is given the prospective sheet metal worker, obviously is not productive of quicker results than is apprenticeship in a shop.

Production plants can not take in apprentices and train them on the job, except possibly, in the operation of a punch or drill press, which would not constitute a training in sheet metal work.

Young men may be and are taken into factories and may assist elder workers in their routine operations, but that practice does not compensate for instruction. A certain skill may be acquired by these helpers in performing certain operations, but should the real workers drop out, these helpers would be unable, even after years of employment at their particular tasks, to keep production going. That is so because in modern production there is no one who has time to explain things or show how things should be done.

Vocational School Short Courses

It will continue, then, to be the task of the Public School System to train young men in trades and such specialized work as may equal the performance of the experienced worker in industry. And right now, when it is necessary to produce such workers quickly, the schools maintaining vocational courses will be called upon to depart, for the time being, from the orthodox teaching of the trade and introduce short courses which will train students in one particular line of work or the efficient operation of one machine.

Neubecker Pattern For Offset Fitting

(*Continued from page* 59)

the division *4-5* in the semi-circle in true elevation in Fig. 2 as radius and using *4* in Fig. 5 as center, describe a short arc near *5* and intersect it by an arc struck from *5* as center with the true length of the solid line *5°-5* in Fig. 3 as radius.

Proceed in this manner, using alternately first the proper numbered division in the "oval" in plan in Fig. 2, then the proper numbered true length of dotted line in Fig. 4; the proper numbered division in the semi-circle in true elevation in Fig. 2, then the proper numbered true length of solid line in Fig. 3. Proceed in this manner until the line *7°-7* in Fig. 5 is drawn. Using the division *7°-7°°* in the "oval" in plan in Fig. 2 as radius and *7°* in Fig. 5 as center, draw a short arc near *7°°* which intersect by an arc struck from *7* as center with *7°-7°°* in Fig. 3 as radius. Complete the pattern in this manner and through the points of intersection so obtained trace lines as shown. Then will *4-4°-12°-4°-4-11-4* be the net pattern shape.

Allow for laps as required.

Finding Area of Round Outlet

Fig. 6 shows the accurate rule for finding the true diameter of the round top outlet, regardless what the shape of the base may be and requires no further explanation. To avoid computation, this diameter of the round outlet could be found by using a Table of Circumferences and Areas as follows: Knowing that the area of the 15-inch square in Fig. 6 equals 225 square inches, add to this the area of a 15-inch circle. Using the Tables, follow the Diameter column to 15 and find the area of 176.715, to which 225 is added, making a total of 401.715 or, say, 402 sq. in. Now follow the Area column to 402, which indicates a 22⅝-inch diameter for the upper round outlet.

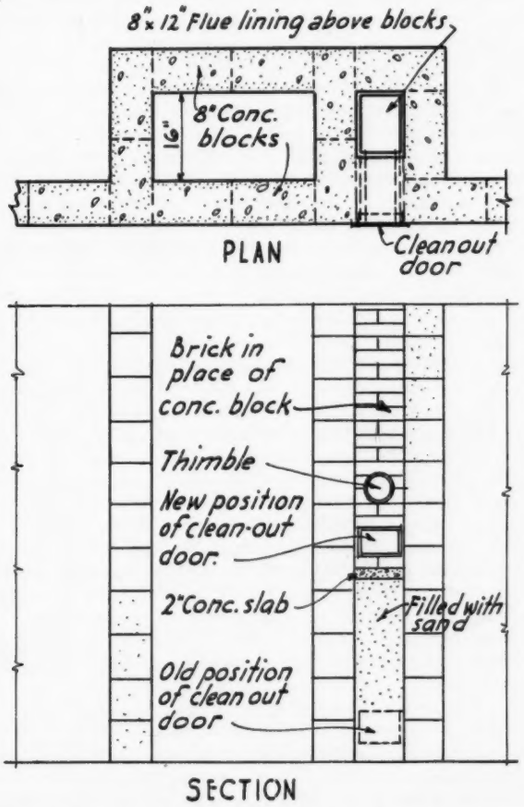
The PROBLEM CORNER

Leaky Chimney Walls

American Artisan:

In this vicinity it is common practice to build the base of the furnace and chimney flues of the same concrete block as the basement walls. The base containing the ash dump and cleanout is built as high as the basement wall and is then continued as brick construction.

On several jobs we found very poor draft and on some jobs practically no draft. Investigation showed that air was finding its way through the wall and into the openings for the cleanout door. This cleanout door is steel and projects into the opening about two inches. This leaves



about six inches of block with the block air space open. The opening for the furnace flue would be 16 by 16 inches, leaving a large ash pit. We are sure there is air flow in the flue base.

Our remedy was to cut out the blocks and build with brick, filling the large ash pit and raising the cleanout door so that there was about one foot of space between cleanout door top and bottom of furnace smoke pipe hole.

Recently we had all this done before we set the furnace, but the F.H.A. inspector says we have to lower the cleanout door to the basement floor. Arguments are of no avail. What can we do?

M. T., Michigan.

Reply by
The Editors

If your F.H.A. inspector will not permit you to reconstruct the chimney ash pit as described in your letter, there is only one suggestion we can make, and that is, cover the outside of the concrete block and if possible the inside also with a heavy wash of plaster or cement. If you will use a rich cement mixture with fine grains and applied with a trowel just as you would put on stucco and be sure to trowel the mixture thoroughly on the block, you should be able to seal all of the openings through the block joints.

There is no appeal from decisions of F.H.A. inspectors so far as we know and we do know of one or two cases where the procedure described above has remedied the condition.

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Register Air Temperature With Outside Air

American Artisan:

We are figuring a system using some outside air. The heater we will use has an input rating of 400,000 Btu per hour. The air delivery is 5,150 cfm. The temperature rise through the unit is 50 degrees when the room temperature is 70 degrees.

When 80 per cent of the air to the heater is 75 degrees and 20 per cent of the air is 20 degrees below zero what is the temperature of the mixture?

W. J. K., Michigan.

Reply by
The Editors

There are two formulas for determining the mean temperature of a mixture of return and outside air. One formula is:

$$t_m = \frac{Rt_r + Ft_f}{R + F}$$

where t_m = temp. of mixture in deg. F.
t_r = temp. of return air in deg. F.
t_f = temp. of outside air in deg. F.
R = weight of return air in pounds per minute
F = weight of outside air in pounds per minute

Where t_f is below 0° F. the value of Ft_f is negative and should appear so in the computation.

Substituting your values in the formula we have:

Weight of mixed air is—

80% of 5,150 cfm = 4,120 × .07424 = 305.87 lbs./min.
20% of 5,150 cfm = 1,030 × .0904 = 93.11 lbs./min.
.07424 = weight of dry air at 75 deg. F.
.0904 = weight of dry air at —20 deg. F.

Then;

$$\frac{(306 \times 75°) + [93 \times (-20°)]}{306 + 93}$$

$$= \frac{22950 - 1860}{399} = \frac{21090}{399} = 53°$$

The weight of air at 53° is .07743, so

399 cfm ÷ .07743 = 5,153 cfm.

Association Activities

Coming Conventions

1940

Dec. 10-11—National Warm Air Heating and Air Conditioning Association. 27th Annual. Committee Meetings on the 9th. Hotel Statler, Detroit. George Boeddener, Man. Dir., 5 E. Long St., Columbus, Ohio.

1941

Feb. 10-12—Sheet Metal Contractors Association of Wisconsin, Inc. Annual. Hotel Pfister. Paul L. Biersach, Secretary.

Indianapolis

The present list of officers of the Air Conditioning Council of Indianapolis, Indiana, is as follows:

President—Wm. F. Freije, c/o Hayes Bros., Inc., 236 W. Vermont St., Indianapolis.
Vice Pres.—I. W. Cotton, 146 W. 16th St., Indianapolis.
Secy.-Treas.—E. S. Hildreth, c/o Indianapolis Power & Light Co., 17 N. Meridian St., Indianapolis.

Activities during the year have been concentrated on the development of an air conditioning code for the local contractors and dealers. This code, as and when it is completed, will probably be set up as a model of approved practice and requirements for Indianapolis and vicinity.

Another activity has been the preparation and the presentation of three air conditioning radio broadcasts over station WIRE all within the last ten months. The second annual Council picnic and other activities of a lesser nature comprise the balance of our work. Our membership has grown from an initial ten members to a present roster of 43 member firms.

The local city building commissioner advises that residential building showed a total of 630 houses costing $5,000 or under for the first seven months of 1940. This is an increase of 70 percent for the corresponding period of 1939. Approximately 95 percent of these homes are equipped with warm air heating systems, a large number of which are stoker or oil-fired and with furnace blower fans.

The mechanic situation finds all good men employed, the unemployed being confined to the less skilled type of worker. With regard to the apprentice situation, Arsenal Technical High Schools of the city have conducted for the last five years a division given over exclusively to such work. Their vocation co-ordinator, Herbert Kessel, advises that apprentice courses for the great majority of mechanical trades are available. There has been a decided movement on foot to make sheet metal courses more practical and to reduce the time required to learn enough sheet metal craftsmanship to go to work. This institution has very good courses not only in sheet metal fabricating, but also in tool and die work, welding, foundry practice, carpentry, electrical and other allied trades.

E. S. Hildreth, Secy.-Treas.

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Milwaukee

Executive Secretary Paul L. Biersach of the Milwaukee Sheet Metal Contractors Assn., Inc., reports that mechanics are scarce. Government work has cut into the list of available good mechanics and those applying are of mediocre quality.

Day and evening classes at the vocational schools are always filled up.

St. Louis

The St. Louis Heating & Sheet Metal Wholesalers Association has had no meeting since May, but just as soon as the weather breaks will again have meetings, following along the lines of dealer education as suggested at the Chicago meeting.

Oscar P. Brauer, Secretary.

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Chicago

In a letter to the trade from President Louis E. Drehobl of the Furnace, Air Conditioning & Sheet Metal Institute, there is listed some of the things the Institute has done for the dealer—among them the battle for recognition of the average-size shop under NRA, favorable ruling on chauffeurs' license as it applies to the sheet metal shop, saving of thousands of dollars through our attorney's sales tax work, blocked proposed troublesome roofing orders, clarified ruling on application of wages and hours act to our trade, reduced furnace license expense, conducted helpful cost accounting program, and fought for the interests in Little Business Men's activities in Washington.

With the September 26th meeting, the Institute launched forth on its eighth year of constructive activity to promote and safeguard the interest of the independent furnace and sheet metal contractor.

During the past year the Educational Committee has brought to the meetings some noted speakers able to leave valuable data with our members and which contractors could profitably apply in the everyday conduct of business.

Educational plans for the winter of 1940-41 are now in the making and are expected to be of more value than ever before. In order to attract a notable array of speakers, it is necessary to have the whole hearted interest of the trade in the work being sponsored for their interest. The Membership Committee urges every member to assist the officers in their efforts by attending every possible meeting. The Committee also invites sheet metal and furnace contractors to serve their own best interests by investigating the benefits of membership in this group. An enclosed postage-prepaid card is sent with a request for ideas on the work members and others would like to see the Institute carry on in the months to come. Nonmembers are cordially invited to check the section of the card referring to membership information.

The September 26 meeting—an open nite for members and friends—honored "Jim" Slight of the Northwestern Stove Repair Company, a loyal member. Jim said a few words in place of Ed Nemec, guest speaker, who was called out of town unexpectedly. Mr. Nemec, who is close to every division of the industry, was scheduled to talk on the "Outlook for 1940 Fall Business."

The regular short business session of the Institute reviewed latest legislative development affecting business, including

New developments on 2-flat furnace heating;
New Sales Tax Ruling;
A review of the local Water Department move to hurt our humidifier business.

Roy L. Hird reviewed troubles encountered by sheet metal contractors in handling their insurance matters. Mr. Hird covered insurance in general and gave the audience some very valuable information on all types of insurance in which our members are interested.

Refreshments served by the Committee concluded the meeting.

Louis E. Drehobl, President.

Association Activities . .

National

The whole world is invited to attend the 27th annual convention of the National Warm Air Heating and Air Conditioning Association to be held in Detroit, Hotel Statler, on December 10th and 11th. One of the important and colorful features on the two-day program is that devoted to "Air Information—If You Please!"

Through a poll of the membership of the Association six members have been elected to sit on the "Air Information—If You Please" Committee. These members will sit at the round table on the platform and it will be up to them to answer all questions which are presented from the floor and which have previously been presented in written form.

One of the regulations of the "Air Information—If You Please" program is that only questions relating to the warm air heating industry be submitted. These questions can cover the various branches of the industry, which will include retailing, wholesaling and manufacturing. Every effort will be made to answer all questions, and right now do your bit by sending in your written request covering any questions which you would like to have presented to the Committee of Six, in care of the National Warm Air Heating and Air Conditioning Association, 5 East Long Street, Columbus, Ohio.

We believe that the "Air Information—If You Please" program will result in bringing out much information and many ideas which will be helpful to manufacturers, jobbers and retailers to further promote the best interests of the industry.

In addition there will be many interesting subjects presented by prominent speakers covering technical research, publicity and merchandising.

The "Yardstick for the Evaluation of a Forced Warm Air Heating System" will be submitted in complete and published form by Professor Konzo, Chairman of the Joint Yardstick Committee, and F. G. Sedgwick, Chairman of the Research Advisory Committee. Guest speaker, Robert K. Thulman of the Federal Housing Administration will discuss the Yardstick from the consumer angle. Frank E. Mehrings, Chairman of our Publicity and Merchandising Committee, will interpret the Yardstick from the marketing angles and in addition will present a brand new sparkling and informative consumer booklet which will direct the attention of prospects to the "Yardstick for the Evaluation of a Forced Warm Air Heating System."

The Yardstick might be termed the industry's "Declaration of Installation." It will rank in importance with the many other outstanding accomplishments of the Association for the industry. The Yardstick will be the platform not of intent but of accomplishment in which warm air heating contractors, jobbers, distributors and manufacturers will combine to create higher standards of installation practice to insure for the home owner, more comfort, convenience and economy of operation.

The reason why our industry has reached its pinacle of successful domination of the domestic heating market is not because of price or that success just happened. Consumer preference for warm air heating has so outstandingly asserted itself because the pioneers in the industry twenty-five years ago focused the industry's knowledge hungry beams of light, on the Technical Research Program. The results of this tremendous program costing hundreds of thousands of dollars are definite.

The Manufacturer Members of our Association represents approximately 80 per cent of the production of the industry. We do want to encourage those manufacturers who are **not** members to ride with us. The ticket is not expensive and we can assure a smooth ride over the problems of the industry. Our services are multiple—Technical Research, Installation Codes, Publicity and Merchandising, Michigan State College Short Course, Elimination of Waste, Traffic, Credit, Membership and Legislative. Write for the booklet "Leadership Program." If you have a stake in any branch of the warm air industry, drive it with us. George Boeddener, Man. Dir.

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Fox Valley, Illinois

The Fox Valley Furnace and Sheet Metal Contractors Association of Illinois is now seven years old. A dinner and anniversary meeting was held September 19, commemorating the event with A. F. Frazee, of Dowagiac Steel Furnace Co. as guest speaker. After the meeting a buffet luncheon and general get together was held.

President Jack Stowell opened the meeting with a brief summary of the association's accomplishments and paid tribute to past officers and committee men who have worked so untiringly to make each meeting and each association activity the success they have been. J. D. Wilder, American Artisan, briefly pointed out some of the needs for association strength and activity in the tremendous business potential brought about by the re-armament program and the subsequent problems of specifications, labor relations, materials, and regulation.

Guest speaker Frazee briefed the address he gave at the June meeting of the N. W. A. H. & A. C. Association—"Don't Overlook the Gravity Furnace." In June Mr. Frazee predicted a 25 per cent increase in furnace volume for 1940 over 1939, but all indications are that 1940 will be 34 to 35 per cent ahead of 1939 when the year's business is tabulated. "If you are not making money now, you never will," declared the speaker.

"This industry has seen many changes in the last ten years," said Mr. Frazee, and enumerated three of these as—1—many manufacturers have installed laboratories in which to test their products and develop and improve old ones. Some of these laboratories never shut down. 2—"Big name" companies have contributed much, principally in the way of merchandising ideas. They have compelled old line manufacturers to modernize their products, methods, ideas. These companies have introduced modernized merchandising, but they have not been able to lick the problem of high overhead. They have not been particularly successful in handling field and shop fabrication and installation problems. 3—Greatest change of all; furnace heating has swung from gravity to forced air (so far as public interest is concerned) and the industry has devoted practically its entire attention to forced air design and installation.

This attention to forced air, said Mr. Frazee, is understandable, but somewhat regrettable because it has caused the industry to overlook the gravity furnace. According to figures there are in use today between 8 and 9 million furnaces. More than 5 million of these are more than 10 years old and at an annual replacement of 10 per cent, 500,000 furnaces should be replaced each year. There are about 400,000 air conditioning units.

Mr. Frazee showed breakdowns of furnaces in place by areas which showed over 3 million furnaces in the five states of Ohio, Indiana, Illinois, Michigan and Wisconsin and another 1½ million in the middle west, west of the river. The speaker also showed required house construction as 600,000 new homes—150,000 replacements and 450,000 houses for new families. As to house costs 45 per cent will be in the $3,000-$5,000 bracket and 35 per cent in the $5,000-$7,000 bracket.

Whether gravity of forced air for new houses, Mr. Frazee projected figures from cities having permits to show that in 1939 28 per cent of new homes were heated by gravity warm air, 39 per cent by forced air; in replacement homes 12 per cent by gravity and 3 per cent by forced air, making a total for warm air of 82 per cent with the remaining 18 per cent going to radiator heat.

Booked orders from government reports showed an overall gain of 27 per cent for 1940 over 1939, with forced air showing a 15 per cent gain over the first quarter of 1939 and gravity showing a 38 per cent gain over the first quarter of 1939.

Interesting, because of all the discussion over low cost houses, was the report that in 1939 some 500,000 circulating heaters were made and sold.

Association Activities . .

New York State

After several years of planning and tireless effort on the part of the officers and directors of New York State Sheet Metal, Roofing and Air Conditioning Contractors' Association, Inc., the group compensation has finally been formed and a definite set up made in a meeting recently held in Syracuse, New York.

Several group managers were interviewed by a special committee, and after their reports to the State Board of Directors, the directors voted to award the managership to the firm of Laverack & Haines of Buffalo, whose responsibility and ability to properly manage the proposed new group appeared the most outstanding of those interviewed.

A committee to look after the interests of the members to be accepted in the group was proposed by President Ballard and accepted by the directors. The Committee is made up of the following members:

Clarence J. Meyer, Chairman, 569 Genesee St., Buffalo.
William Schmitt, 60 Brown St., Rochester.
Henry Steinhorst, 612 South St., Utica.
Arthur Heaphy, 133 N. Geddes St., Syracuse.
Patrick Varden, 175 Watervliet St., Albany.
H. A. Daniel, 134 Washington St., Newburgh.

This Committee will receive applications from anyone in the industry outside of Metropolitan New York, and if the application is accepted, will receive such applicant into the group. Because of the fact that this group will be run to save money for the member, the applicant must show that he is a legitimate and responsible contractor, one who is interested in helping to keep the accident rate down to a minimum, and who will co-operate with the committee to that end. The Committee investigation of other groups has shown that savings of 25 to 50 per cent of premiums have been made.

Names and addresses of all New York State contractors of record have been given to Laverack & Haines, and their Field Men will make personal calls to many firms. Contractors interested in saving money on compensation should write at once to any one of the committee members. In about sixty days the group will be in operation, and anyone not an accepted member when the group is formed will have no chance to become a member after dividends are payable.

Contractors cannot pay more for compensation than they pay now, by joining this group—that is a state law—but it is possible to save as much as 50 per cent.

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Illinois

The Executive Committee of the Illinois Sheet Metal Contractors Association met on Saturday, September 28, at Peoria.

Contractors reported inability to get competent mechanics, so many are drawing on St. Louis where the East St. Louis local has jurisdiction. Membership in the state association is felt to be too small considering that most shops are busier than in years.

Officers are:

Joseph J. Walter, President, 326 Main St., Ottawa
C. H. Lauerman, Vice President, 237 Tompkins St., Galesburg
Frank I. Eynatten, Treasurer, 306 Krause St., Peoria
J. E. McMackin, Secretary, Salem

"The Illinois Warm Air Heating Contractors Act" proposed and sponsored by The Sheet Metal Contractors Association of Illinois was our hope last year, and we expect to work on it again this January. The legislative Committee on this act consists of

L. E. Drehobl, 4978 Milwaukee Avenue, Chicago
W. A. Sargent, 619 Court St., Pekin
C. H. Lauerman, 237 E. Tompkin St., Galesburg
W. W. Johns, 212 W. Main St., Urbana
Joseph J. Walter, 326 Main St., Ottawa
Ralph W. Poe, 44 White Court, Canton
Frank I. Eynatten, 306 Krause St., Peoria
J. E. Peterson, Chairman, 20 W. Hinsdale Ave., Hinsdale

J. E. McMackin, Secretary.

Chicago Warm Air Golf Association

At the final session of the Chicago Warm Air Golf Association at the "Tam-O-Shanter" course, there was a good attendance for golf and for the banquet presided over by the retiring president, Harry Ebbert.

For the new season, the following officers were elected:

President—Grant V. Wilson.
Vice President—Harry Ebbert.
Treasurer—Paul Barth.
Secretary—Ed Smith.

The official golf game scores were reported as follows:

R. W. King, 1st low gross..... 86 (Cup)
W. D. Monroe, 1st low gross..... 81 (Non Regular)
Larrie Wahlquist, 2nd low gross..... 87
Hugh Courteol, lowest number puts..... 32
Ray J. Lorenz, 2nd lowest number puts. 35

◆

Northeastern Ohio

The final Golf Meet of the season for the Northeastern Ohio group of the National Warm Air Heating and Air Conditioning Association was held at Congress Lake, northeast of Canton, on Friday, September 13, with Messrs. Steenrod and Farrell of Milcor Steel as hosts.

Excellent weather favored the largest group of the season and some of the crack golfers were in fine form.

Al. Galaba of Morrison Products and Hugh O'Neil of Electric Vacuum Cleaner tied for low gross and received suitable prizes. Harold Sharp of Henry Furnace and Foundry won the blind bogey and a leg on the R. A. Jack trophy. Golf balls were distributed to other prize winners.

At the dinner which followed, Alex Steenrod acted as chairman and distributed the prizes in his own style. He then introduced H. S. Sharp, vice president of the National Association, who spoke briefly on the advantages of the association and the good it was doing for the entire industry. Past National President W. L. Rybolt, of Rybolt Heater Co., Ashland, was next introduced and he too spoke of the value of the association to the various manufacturers, jobbers and dealers in the industry and issued a plea for a more cooperative spirit on the part of everyone engaged in the industry, so that the work of the association would prosper. C. E. "Jim" Wilcox, president Grant Totten, Inc. of Canton, was introduced and spoke of just what the National Association did and should mean to the wholesalers, and their active participation in the work. Ed. Schane of Fanner Mfg. Co. entertained with Scotch dances. Everyone was in agreement that it was the best meet that the association had held.

Plans are being made to hold luncheons in Cleveland at stated times during the winter and formal notices will be mailed.

R. A. Jack.

Obituary

J. R. Boardman Passes

J. R. Boardman, president and general manager of the Boardman Co., sheet metal manufacturers at Oklahoma City, Okla., died of a heart ailment recently.

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Leo J. Biek

Leo J. Biek, President of the Biek Furnace Supply Company of Dowagiac, Mich., 37 years old, died September 1st. Leaves a widow and a boy, 7. Mr. Biek, formerly associated with Rudy Furnace Co., has been connected with the warm air furnace industry for a number of years.

◆

Edward C. Barrett Passes

Edward C. Barrett, 76, vice president of the Barrett Hardware Co., Joliet, Illinois, died at his home—612 Western Avenue—on July 30th. Mr. Barrett is survived by his wdow, a son, W. Franklin Barrett, president of the company—and a daughter.

The company was founded in 1850 and does both a wholesale and retail business. For some years the company operated their own sheet metal business.

CONTROL MASONRY DRAINAGE

This Simple Inexpensive Way

Easy-to-install Anaconda Through-Wall Flashing provides effective protection against wet walls and heaving by frost

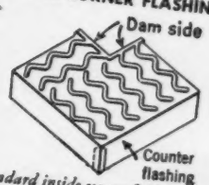
In addition to providing drainage in any desired direction, by means of an integral dam, Anaconda Through-Wall Flashing offers these three distinct features:

1. 7/32" high zig-zag corrugations provide positive bond with the mortar in all lateral directions.
2. Flat selvage permits neat, sharp bends for counter-flashing or locking to adjacent sheet metal without distorting the flashing or interfering with free drainage.
3. It is easily locked endwise, even with edges bent, merely by nesting one or two corrugations. Such assemblies are water-tight because of the raised corrugations.

Made of 16-ounce Anaconda Copper for standard 8" and 12" walls, these flashings are stocked by leading sheet metal supply houses in 8' lengths, together with unique one-piece corner flashings which provide effective and easy assembling. Also available in special widths with various selvages. 4086

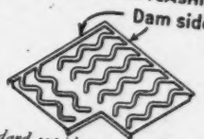
Installing Anaconda Through-Wall Flashing in the Liberty National Bank, Washington, D. C. Architects: *Schreier & Patterson*, General Contractor: *C. Wohlgemuth, Jr.*, Sheet Metal Contractor: *Crouch & Burke—all of Washington, D. C. Anaconda Through-Wall Flashing supplied by York Corrugating Company, Washington, D. C.*

INSIDE CORNER FLASHING



Standard inside corner flashing unit. Dam on inside, drains out.

OUTSIDE CORNER FLASHING



Standard outside corner flashing unit. Dam on outside, drains in.

ANACONDA

Anaconda Copper

THE AMERICAN BRASS COMPANY—General Offices: Waterbury, Conn.
In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ont.
Subsidiary of Anaconda Copper Mining Company

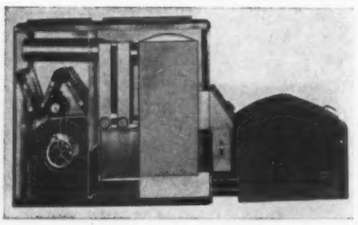
New Products

For your convenience a number has been assigned each item. Circle the items in which you are interested on the coupon on page 104 and mail to us.

● Indicates product not listed in 1940 Directory.
△ Indicates manufacturer not listed in 1940 Directory.

207—Trojan Conditioner

Auburn Burner Company, Auburn, Indiana, announces the Trojan stoker-fired air conditioner providing 150,000 Btu. This unit filters, humidifies



and circulates the air. A feature is the long flue travel. The cool air is filtered before entering the fan, and is automatically humidified after leaving the fan. The unit is housed in a baked enamel cabinet and fired by a Trojan stoker, hopper or bin feed.

A clinker chute and receptacle is built into the unit.

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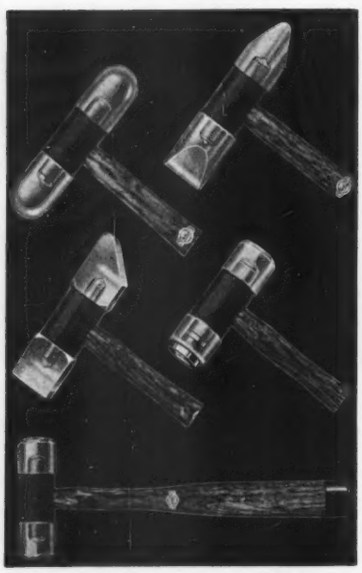
208—Soft Face Hammers

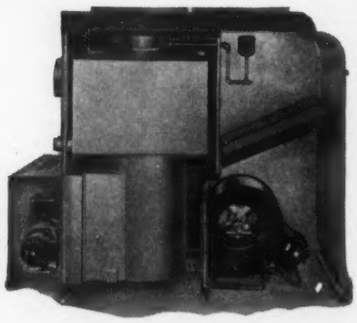
Stanley Tools, New Britain, Conn., announces a new line of soft face hammers with varied shaped heads for sheet metal work or delicate work which should not be nicked or



marred. The tips are made of Stanloid —a tough resilient, non-metallic substance. Hickory handles are securely wedged in a steel center body.

209—Quiet May Conditioners

May Oil Burner Corporation, Maryland and Oliver Sts., Baltimore, has designed and is now manufacturing its own line of winter air conditioning units. There are five models, with maximum output at conditioner of 72,000, 100,000, 120,000, 160,000 and 200,000 Btu.



The heating element is of high quality steel, completely welded. The secondary heating chamber is permanently welded to the main heating chamber. The radiator surrounds the main heating element. A heat reflecting insulating lining is welded to the inside walls of the cabinet.

A large, slow-speed blower fan is used—sound insulated and its driving motor separately mounted on resilient rubber cushions. The humidifier has a porcelain enameled reservoir and automatic water supply valve. Spun

glass fibre filters are used. Cabinet is all-steel, finished in two-tone grey enamel. A register is provided for basement heating.

Quiet May double Sapphire jewelled oil burner, powered by "Gerotor" pump, supplies the heat.

● 210—Firing Assembly

Conco Corporation, Mendota, Illinois, is incorporating a new improved firing assembly in the construction of the Conco oil-fired airconditioner and Conco conversion oil burner lines.

The new firing assembly represents a new principle of mixing oil and air for combustion. By the new principle, air for combustion is forced by the fan over the motor and pump, cooling both and forcing any oil odors out through the air tube into the furnace. The air stream, instead of being forced in a direct blast past the nozzle and cutting across the cone of oil sprayed out the nozzle—which would produce a long, torch-like flame—is instead caused to flow through the turbine-like blades of the turbulator where it assumes a swirling, tornado-like motion.

The air cone which directs the flow of air around the cone of oil is an integral part of the firing assembly and is factory set to insure proper placement.

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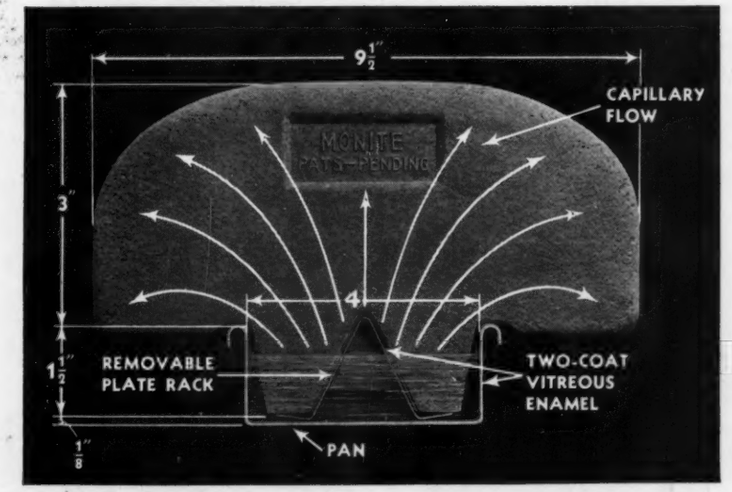
211—Blower-Filter Units

The Peerless Electric Company, Warren, Ohio, announces new cabinet type blower units for converting gravity furnaces to warm air conditioners —available in both belt and direct drive types, running from 6¼ in. diameter on the direct drive up to 21 in.

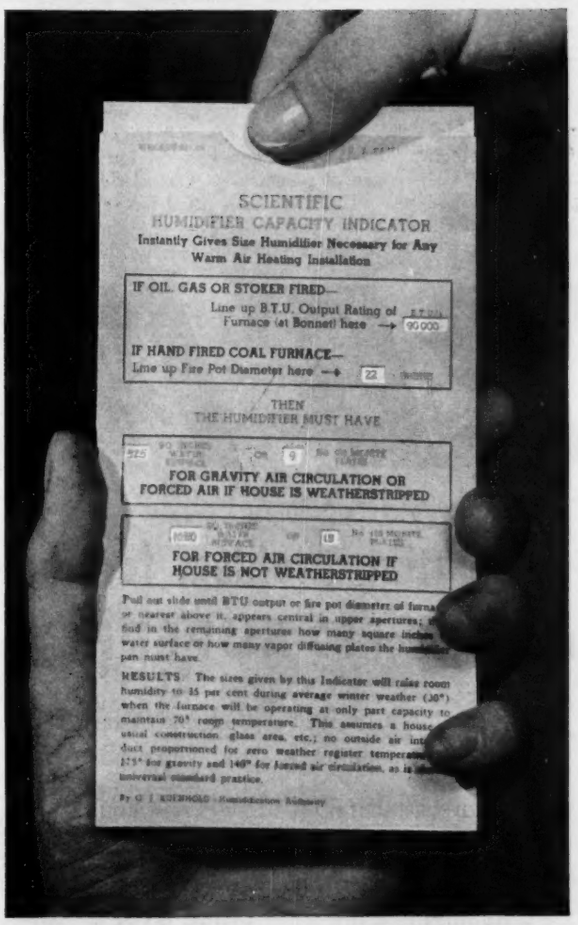
diameter on the belt drive. Capacities run from 900 cfm. against ⅛ in. s. p. to 6,000 cfm. against ½ in. s. p.

These units are of new construction, giving maximum amount of filter area, facilitating filter access, have new rounded corner construction, and are finished in a new smooth green hammertex finish.

AGAIN! MONMOUTH IMPROVES VAPOR DIFFUSING PLATES



3 Plates Now Do Work of 4. This means fewer plates and shorter pan, giving *8½ to 30% Lower Prices* on Monmouth Vapor Diffusers—according to size. Greatest evaporating capacity per dollar ever offered. Each Monite plate now equivalent to 70 sq. ins. water surface. The 4″ wide pan, when filled with plates, is now equivalent to a 70″ wide pan of same length. Evaporating capacity of pan increased 1750 per cent. Get the new price sheet with latest capacities and prices.


SCIENTIFIC
HUMIDIFIER CAPACITY INDICATOR
Instantly Gives Size Humidifier Necessary for Any Warm Air Heating Installation
IF OIL, GAS OR STOKER FIRED—
Line up B.T.U. Output Rating of Furnace (at Bonnet) here →
90 000
IF HAND FIRED COAL FURNACE—
Line up Fire Pot Diameter here →
22
THEN
THE HUMIDIFIER MUST HAVE
OR
9
FOR GRAVITY AIR CIRCULATION OR FORCED AIR IF HOUSE IS WEATHERSTRIPPED
OR
18
FOR FORCED AIR CIRCULATION IF HOUSE IS NOT WEATHERSTRIPPED

HUMIDIFICATION IS PURE BUNK, UNLESS

there is sufficient capacity to do an honest job of humidifying. It is to your advantage to *know* how much water surface, or the equivalent, a humidifier for any given furnace installation should have.

THIS HUMIDIFIER CAPACITY INDICATOR

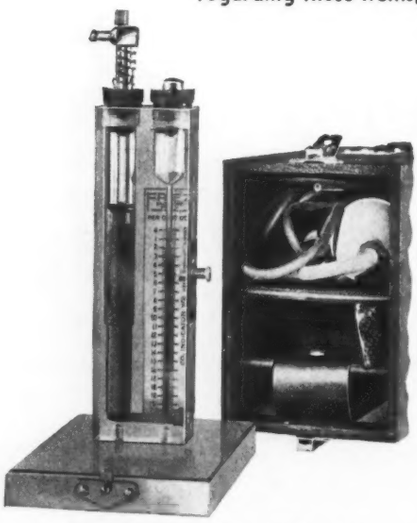
instantly tells the capacity of any humidifier or the size humidifier required. It's a powerful aid in selling humidifiers at higher price and profit. SENT FREE TO HEATING MEN. Write today for yours.

MONMOUTH PRODUCTS CO.
1933 E. 61st Street **Cleveland, Ohio**

MONMOUTH
The Greatest Name in Humidification

New Products . . . . . .

Fo your convenience in obtaining information regarding these items, use coupon on page 104.



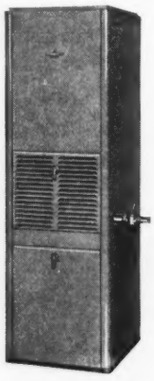
212—New CO_2 Indicator

Julien P. Friez & Sons, Division of Bendix Aviation Corporation, Baltimore, Maryland, announces a new Carbon Dioxide Indicator.

The Indicator is supplied complete with a carrying case, in which space is also provided for a Stack Thermometer and a full-size Draft Gauge.

213—Superfex Gas-Saver

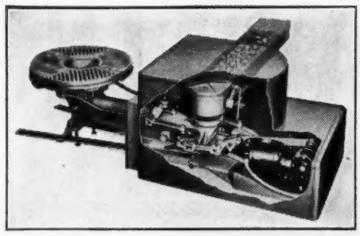
Perfection Stove Company, 7609 Platt Avenue, Cleveland, announces a new model Superfex air conditioning furnace with heating capacity at reg-



isters of 66,500 Btu. (gas input—AGA rating—87,500 Btu.), featuring the three-stage principle of operation.

The combustion chamber has dual radiators, made of 16-gauge steel, with eight baffles each.

The unit occupies approximately 4 square feet of floor space (24½x24½ inches).



•214—Bryant Coke Stoker

The Bryant Heater Company, 17625 St. Clair Avenue, Cleveland, is distributing the Bryant Coke stoker—an under-feed, natural draft device, fully automatic with a conveyor to transport the coke from the bin to the stoker and with provision for mechanical ash handling.

The coke tube turns up through an elbow, the exit of this elbow being in the center of the grate.

The grate is flat and circular and rests on the end of the coke elbow and also on ash rings. The grate has slots to permit ash to drop down into the ash pit and is given a slight oscillating motion — the amount of shaking is capable of regulation. A pair of reciprocating plates draws the ash back out of the pit and deposit the ash in under-floor ash receptacles.

The grates, as well as other parts coming in contact with burning fuel, are of niresist, a cast-iron alloy.

The operation of the mechanism is under the control of the fuel level, a weight resting on the fuel beds.

HERE IT

The perfect answer to the heating problem for the Low Cost House!... the new Model 80 SUPERFEX

READ THIS GOOD NEWS:

- A complete modern oil burning furnace priced to meet the heating budget for FHA or other low-cost homes.
- All the *sales advantages* of modern oil heat with an operating cost in line with the small home budget.
- Three combinations available—manual operation, automatic, or automatic air-conditioning —to fit low-cost houses of different price levels . . . yet *one* basic furnace handles all three.
- No assembly or installation headaches. Furnace comes completely set up and ready to go.
- It is forecast that 80% of 1941 new houses will be priced at $4500 or under—and here's the way to put *modern* oil heat, even with air-conditioning, into these low-priced houses.
- This is a *real* oil furnace with built-in oil burner, made of finest quality materials. Long flue travel, large heating surfaces, 53,000 B.t.u. at the bonnet.

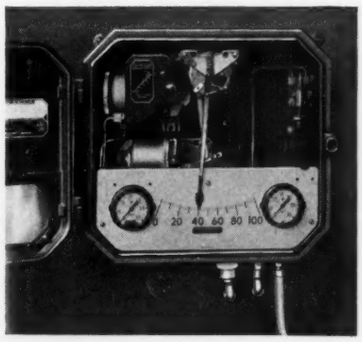
PERFECTION STOVE COMPANY

New Products . . . . . .

For your convenience in obtaining information regarding these items, use coupon on page 104.

•215—Indicating Transmitter

Taylor Instrument Companies, Rochester, New York, offers means of indicating, recording or controlling process variables remote from the



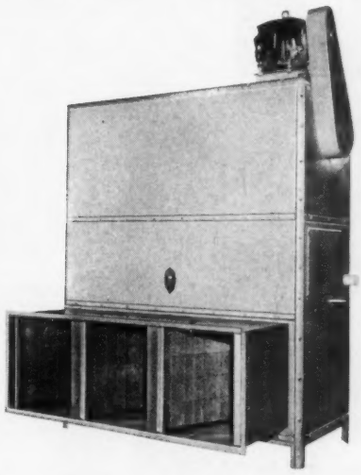
point of measurement—The new Taylor Remote Pneumatic Transmission Systems.

The system measures, transmits and receives continuously regardless of electrical current failures.

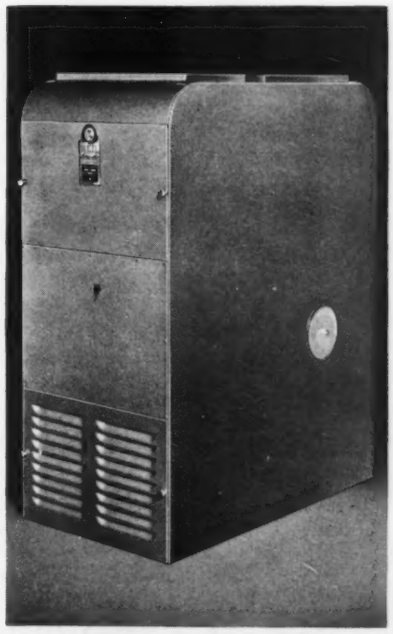
Bulletin No. 98156 describes the advantages of the systems in the measurement and control of pressure, rate of flow and liquid level.

△216—Lindsay Structure Sheets

Dry-Zero Corporation, 222 West North Bank, Chicago, has developed Lindsay Structure sheets for housing



unit coolers, and miscellaneous air conditioning equipment. Standard panel sheets, framing members and fittings can be assembled with simple wrenches—like a "Meccano" set.



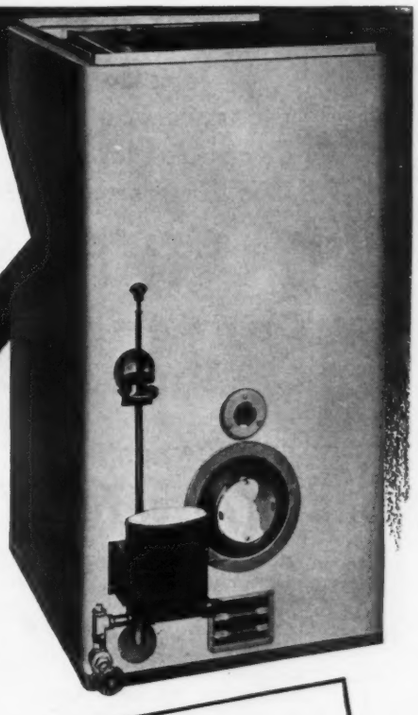
217—Gas-Fired Conditioner

The Heil Co., Milwaukee, Wisconsin, announces an AGA Approved Model F-80 G Heil Activ-Air conditioning unit—a factory-assembled "package unit."

The overall efficiency of the F-80G gives it a capacity rating of 80,000 Btu. per hour.

The burner is of Heil design—atmospheric type.

IS! A MODERN OIL FURNACE WITH BUILT-IN BURNER. COSTS NO MORE THAN COAL-BURNING EQUIPMENT



Three combinations available in one furnace—

1. MANUALLY OPERATED.
2. COMPLETELY AUTOMATIC, same furnace with thermostat and controls.
3. AUTOMATIC AIR-CONDITIONING, same furnace with thermostat, controls, blower, filter and humidifier.

DON'T WAIT! Orders being taken now. Shipments will be made in order of receipt. Write TODAY to PERFECTION STOVE COMPANY, 7269-A Platt Ave., Cleveland, Ohio

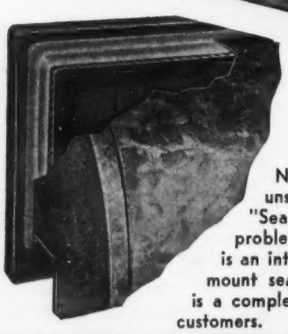
SUPERFEX

CLEVELAND, OHIO

Made by PERFECTION ... the world's largest manufacturer of oil-burning equipment for the home!

The GALE "Seal-Tite" REGISTER

ABSOLUTELY AND PERMANENTLY STREAK-PROOF!



A High Quality Register at a Surprisingly Low Price

The Gale "Seal-Tite" has everything you expect in a register—and in addition, completely solves the problem of wall-streaking. Handsome in appearance. Directs air flow scientifically for greatest comfort without drafts. An outstanding value—you'll be surprised at our reasonable prices and attractive discounts.

ASK YOUR JOBBER

or write us direct for catalog showing baseboard and sidewall types. Sizes: 4"—5"—6"—8"—10" heights. 8"—10"—12"—14"—24"—30" widths. Other sizes made up special.

We also make Char-Gale—
"Pre-Fabricated" Ducts and Fittings and the new Char-Gale Replacement Casings to modernize old heating plants.

CHAR-GALE MFG. CO.

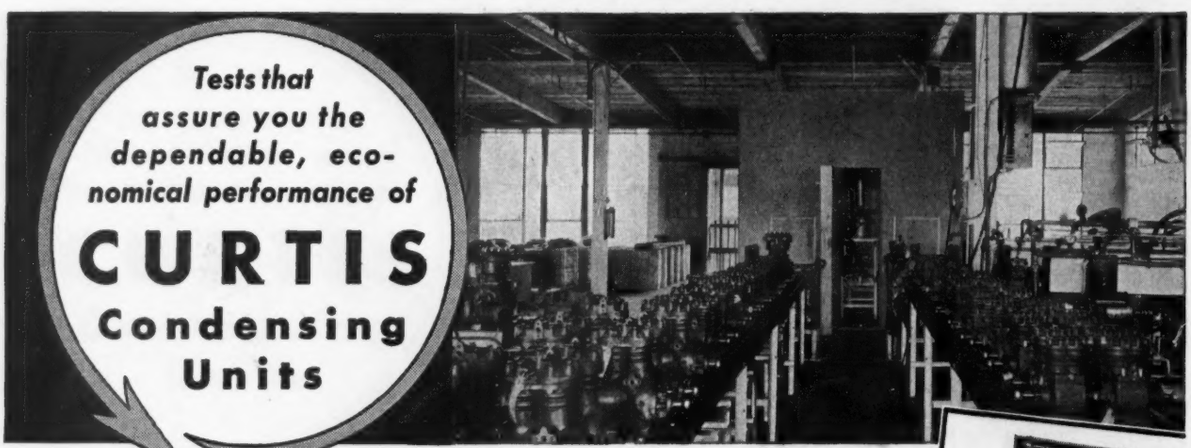
3125 Hiawatha Avenue **Minneapolis, Minn.**

"Seal-Tite" ONE-PIECE CONSTRUCTION ELIMINATES WALL-STREAKING

No more complaints from customers about unsightly soot streaks—if you use the GALE "Seal-Tite" Register. We have solved this problem with an exclusive flexible packing which is an integral part of the back frame. No need to mount sealing frames when roughing-in. The Gale is a complete unit—simplifies your job—satisfies your customers.

Tests that assure you the dependable, economical performance of

CURTIS Condensing Units



The Orifice Test for Volumetric Efficiency

Every Curtis Compressor is given an individual test for efficiency according to standards of the Compressed Air Society. Curtis compressors must maintain a required pressure while running against loss of air through a calibrated orifice—the size of the orifice varying with the capacity of the compressor. This test is reflected in a water column reading that checks volumetric efficiency. The test takes place in an insulated, sound-proofed room where compressors are also checked for quietness in operation.

Curtis compressors that do not meet the exacting standards of this test are rejected by inspectors—one of many examples of the care and precision found in every step of Curtis manufacturing methods. The result is the long life, high efficiency and care-free performance of every Curtis Condensing Unit.

Above—1¾ h.p. Air-Cooled Condensing Unit
Below—15 h.p. Cleanable Shell and Tube Condensing Unit

Write for full information.

Curtis Refrigerating Machine Company
1946 Kienlen Avenue St. Louis, Missouri
Established 1854

CURTIS REFRIGERATION AIR CONDITIONING ••• COMMERCIAL

Division of Curtis Manufacturing Co.

New Literature . . . .

For your convenience in obtaining copies of new Literature use the coupon on page 104.

230—Warm Air Heating Equipment

Richardson and Boynton Company, 274 Madison Avenue, New York City, is distributing a folder illustrating and describing their new Richardson oil-fired winter air conditioner of 104,000 Btu output.

◆

231—Belt Driven Exhaust Fan

Chelsea Fan & Blower Co., Inc., 370 West 15th St., New York City, is distributing a bulletin illustrating the Chelsea belt driven exhaust fan, with and without penthouse, and ranging in size from 12 to 72 inches.

◆

232—Fan Blast Units Catalog 4540

Young Radiator Company, Racine, Wisconsin, is distributing a 20-page catalog (No. 4540) covering their fan blast units—commercial heat transfer units and booster units for air conditioning and industrial applications.

◆

233—Weirton Steel and Its Products

Weirton Steel Company, Weirton, W. Va., is distributing a 24-page catalog with a history of the company, its progress through the years since 1905, and a brief photographic tour of the Weirton mills with descriptive captions on the various processes and the products.

◆

234—Kno-Draft Air Distribution Devices

Plandaire, Inc., P. O. Box 7350, Oakland Station, Pittsburgh, offers a new catalog with complete information on their products—Kno-Draft air distribution devices. Mounting details and dimension tables of models F and SR are included.

◆

235—Engineering Properties of Monel

The International Nickel Company, Inc., 67 Wall Street, New York City, is distributing Bulletin T-5, revised as of September, 1940, and containing technical information. The bulletin is entitled "Engineering Properties of Monel."

◆

236—"Yours for a Warm Friendship"

May Oil Burner Corporation, Maryland Avenue and Oliver St., Baltimore, is distributing "Yours for a Warm Friendship" booklet No. C-134, featuring "Happy" Day, the oil man.

The booklet covers the Quiet May patented double sapphire jewelled Econo-Atomizer, Patented Gerotor pump, complete line of Conversion burners, patented "Ther-MAY-lator" and inserts, Dual utility oil heating units, and air conditioning units.

◆

237—Chronotherm

Minneapolis-Honeywell Regulator Company, Minneapolis, is running a campaign of pages and half pages in Saturday Evening Post, Life, American Home, Better Homes and Gardens, House and Garden, and House Beautiful—all selling automatic heat and urging readers to "See your heating dealer," at the same time calling attention to Minneapolis-Honeywell controls. As a tie-up with the campaign, an amusing poster entitled "Don't Monkey! Use Chronotherm" is being mailed to 30,000 dealers, jobbers and manufacturers.

◆

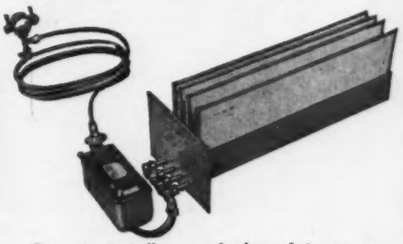
238—Castalu Blower Wheels

The Advance Aluminum Castings Corporation, 2742 West 36th Place, Chicago, has just issued a new 80-page catalog, illustrating their line of "Castalu" fan wheels. There are performance charts and tables showing the capacities of the different sized fans at various speeds and static pressures, based on tests. A new and unique scroll layout, to be used in laying out the housing for any size fan is included. All dimensions shown on the layout are ratios of fan diameters.

YES sir . . . Maid-O'-Mist Humidifiers will evaporate more pounds of moisture per dollar in cost, than other types available. This important fact should be conveyed to every home . . . for every home needs humidity to assure maximum comfort and health to its inhabitants . . . That's where Maid-O'-Mist comes into the picture . . . For the efficient operation of all Maid-O'-Mist Humidifiers, plus the low cost of installation will cinch every deal. Maid-O'-Mist . . . the Humidifiers that are Standard Equipment on many of the country's leading furnaces and are the only humidifiers with National Plumbing Laboratory acceptance against back siphonage codes.

Here are some of the Leaders!

CONVECTOR AUTOMATIC HUMIDIFIER



For Warm Air Furnaces. Easy to install . . . foolproof in operation . . . last indefinitely. Made in 18 sizes with single, double or four troughs . . . will fit any furnace . . . Copper troughs are spaced correctly to assure unrestricted air flow . . . Automatic Water Feeder maintains correct water level in troughs for maximum evaporation. Is shipped completely assembled ready for installation.

No. 9 ZEPHYR AUTOMATIC HUMIDIFIER

For Winter Air Conditioning Units where lower bonnet temperatures prevail. Patented DEFLECTOR WINGS direct heated air over the water surface for greatest efficiency . . . Water-Boy Safety Feeder controls water level in pan automatically . . . Built of brass, copper and Monel metal to avoid corrosion. Comes in two sizes . . . 36" and 26" lengths.

No. 20-H DRIP HUMIDIFIER

Made of the same fine non-ferrous metals as the Zephyr. Deflector wings are eliminated and the water in pan is supplied by Hand Controlled Drip Water Feeder. Comes in 36" and 26" length.

MAID-O'-MIST MANUFACTURES HUMIDIFIERS FOR ALL TYPES OF WARM AIR, HOT WATER AND STEAM HEATING SYSTEMS

—Write for Complete Information Today—

MAID-O'-MIST INC.
AUTOMATIC HUMIDIFIERS FOR ALL TYPES OF HEATING SYSTEMS
213 NORTH ABERDEEN STREET
CHICAGO ILLINOIS

MORE POUNDS PER DOLLAR!

New Literature . . . .

For your convenience in obtaining copies of new Literature use the coupon on page 104.

239—Anemostat Data Sheets

Anemostat Corporation of America, 10 E. 39th St., New York City, offers data sheets covering their Type "C" Anemostat, with suggested specifications. "How to Select Anemostats Types 'B' and 'C'" are also available.

240—Fabricated Pipeless Furnace Gratings

The Independent Register Co., 3747 East 93rd St., Cleveland, is distributing a loose-leaf catalog page—Bulletin No. PG1—covering their Independent "Fabricated" pipeless furnace gratings.

241—Alnor Instruments

Illinois Testing Laboratories, Inc., 420 N. LaSalle Street, Chicago, offers "Alnor Instruments," a loose-leaf binder with their latest literature on Alnor thermometers, air velocity meters, metal detectors, pyrometers and controllers.

242—Airstream Blower Wheels

Hunter Morrison, President and General Manager, Morrison Products, Inc., 16816 Waterloo Road, Cleveland, has published a circular illustrating the features of Airstream blower wheels. Each step in the design and method of manufacture is explained. Complete engineering data, performance curves, and net prices are offered.

243—Basic Ways to Heat a Home

McDonnell & Miller, Wrigley Building, Chicago, is distributing a 4-page folder entitled "Basic Ways to Heat the Small Home." One floor plan, with seven different ways of heating the same home, is shown—one-pipe steam, two-pipe steam, two-pipe hot water, gravity circulation, one-pipe hot water with forced circulation, two-pipe hot water with forced circulation, warm air heating with gravity circulation and warm air heating with forced circulation.

244—Enameling Iron Sheets

Inland Steel Co., 38 South Dearborn St., Chicago, has just published a new engineering bulletin on their Enameling Iron Sheets with a base that gives better performance in the shop and, by means of controlled chemical bond and by mechanical keying, a double grip on porcelain enamel.

245—The Dangers of Dry Air

The Harry Alter Company, 1728 S. Michigan Avenue, Chicago, is distributing a booklet entitled "The Dangers of Dry Air" by Harold W. Schaefer—a non-technical summary of a phase of winter air conditioning written for the lay person. Humidity is simply explained. Satisfactory Relative Humidity is discussed.

246—Design 75 A. C. Registers

Hart & Cooley Manufacturing Co., Holland, Mich., has just issued Bulletin S35, designed for consumer use, to be distributed by both jobbers and dealers. The bulletin covers Design No. 75 air conditioning registers. The No. 75 turning blade valve is adjustable sideways, upwards and downwards.

247—Gas Floor Furnace

John Zink Company, 4401 S. Peoria, Tulsa, Oklahoma, manufacturers of gas burners, oil burners, and combination oil and gas burners, is distributing an 8-page circular covering their floor furnace—25,000, 50,000 and 68,000 Btu. capacity per hour, suitable for 3,000, 6,000 and 8,000 cu. ft. respectively.

Investigate this *Tropic Breeze* HI-BOY

WINTER AIR CONDITIONER

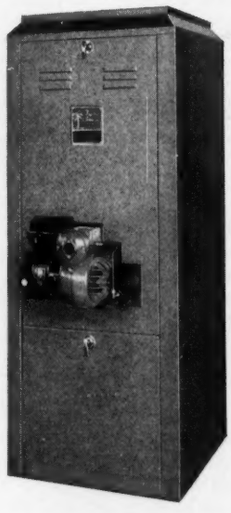
DALZEN MULTI-TIP CONVERSION GAS BURNER

for every type of Heating Plant

Quickly and easily installed in steam, hot water, hot air or vapor systems. Produces more heat from a given amount of gas. Unit includes latest type thermostatic and safety controls. Priced to sell in TODAY'S market—at profitable discounts to dealers. Write us today for full information.

DESIGNED for GAS OR OIL!

Tropic Breeze Burner assemblies are interchangeable for gas or oil firing. Owner can change either from gas to oil or oil to gas—at small cost. Unit takes little more than four square feet of floor space, is not too high for cellar installation, yet perfect for utility room. Will pass through a 28" door. Oil-fired models offered in two burner types—gun and mechanical draft pot. Gas-fired model includes Dalzen Multi-tip burner. A packaged unit, designed for economy, beautifully finished for eye appeal, fully automatic. Priced right—profitable to handle. Write us Today!

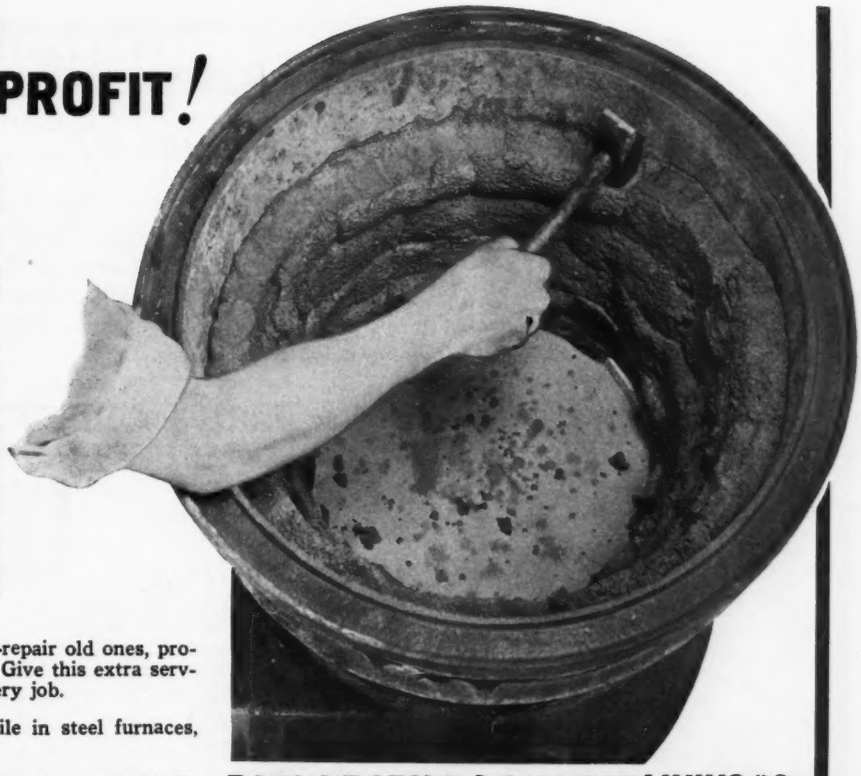


Above is shown Model 100-OPG Hi-Pressure Gun Type burner which will render service-free combustion when firing as low as 7/10ths gallons per hour. Model 100-OPP with Oil Power Pot has all parts completely concealed behind the upper door.

DALZEN MANUFACTURING CO.

511 Leib Street • Detroit, Michigan

something to pound on for PROFIT!



With Fireline, burned-out fire-pots can be made sound and gas-tight at low cost to home owners and at high profit to the furnace man. With Fireline you can give heat the same day. It's fast service and a quick turnover without delays for new castings.

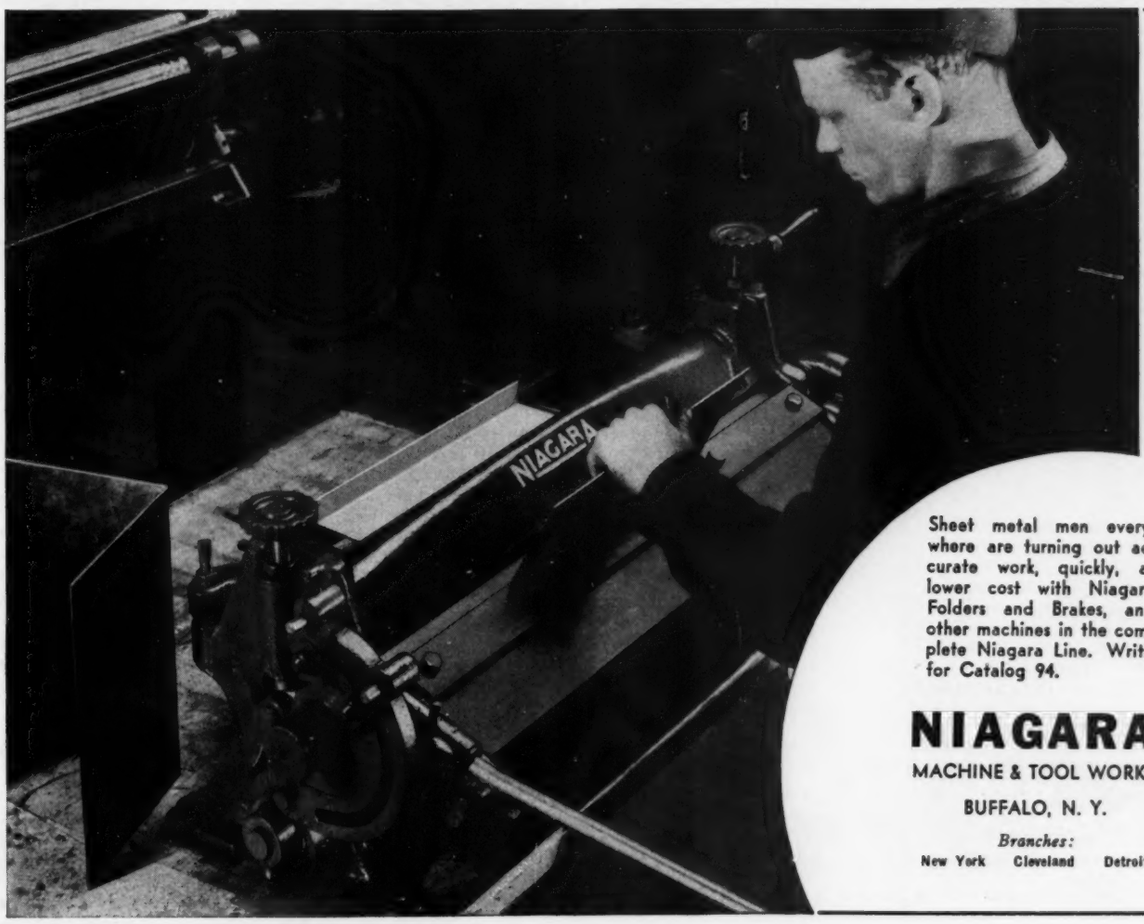
Installed through the furnace door one to 1½ in. thick and covering the entire inside wall of the firepot, Fireline sets into a one-piece refractory lining. It not only repairs but modernizes the furnace—raises temperature of combustion, increases heat-giving capacity, burns smoke and soot, gets more heat out of the fuel and reduces ash . . . actually heats homes better while cutting coal bills. That's why each Fireline installation sells other Fireline jobs.

Fireline every furnace, old or new—repair old ones, protect new ones against burning out. Give this extra service and make this extra profit on every job.

Fireline is ideal for replacing fire tile in steel furnaces, also for stokers and oil burners.

Stocked by leading jobbers everywhere in 50 and 100-lb. drums. Order from your jobber or write us for prices, sales helps and bulletin.

FIRELINE STOVE & FURNACE LINING CO.
1816 Kingsbury St. Chicago, U. S. A.



Sheet metal men everywhere are turning out accurate work, quickly, at lower cost with Niagara Folders and Brakes, and other machines in the complete Niagara Line. Write for Catalog 94.

NIAGARA
MACHINE & TOOL WORKS
BUFFALO, N. Y.

Branches:
New York Cleveland Detroit

H&C DAMPER REGULATOR SETS

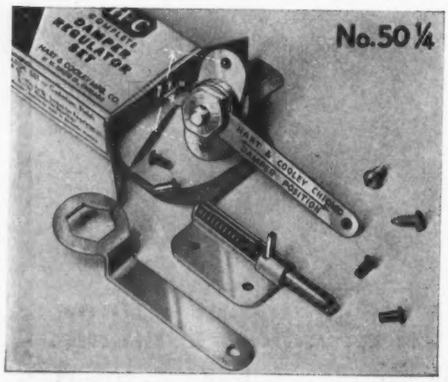
(No. 40¼ S Set with snap bearing is now furnished for No. 40¼ Set at 30c List Price)

ECONOMY TYPE—Quality at a Price!
Furnished with both wing and hexagonal lock nuts. Made only with ¼" Bearings. No. 40¼ S—List Price 30c Set.

Pick the Type that Suits you Best!

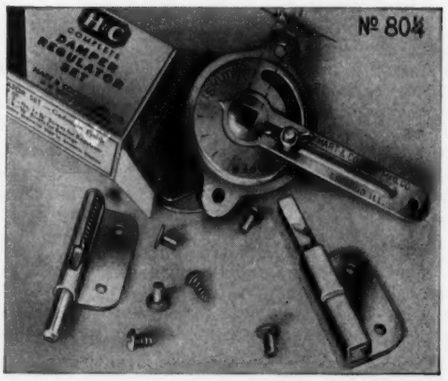
H&C offers three different sets in the ¼" size, all furnished with snap end bearing to permit the installation of even the smallest dampers without bending. All are quality sets in every detail with all parts rust-proofed; all are equally adaptable to splitter or regular dampers. See your Jobber or write for sample and descriptive literature.

HART & COOLEY MANUFACTURING CO.
HOLLAND, MICHIGAN - - Chicago Office at 61 W. Kinzie Street



BRACKET TYPE (left)
With ¼" Bearings. No. 50¼—List Price 40c Set. With ⅜" Bearings. No. 50⅜—List Price 60c Set. ¼" size has snap end bearing.

DISK TYPE (right)
With ¼" Bearings. No. 80¼—List Price 40c Set. With ⅜" Bearings. No. 80⅜—List Price 60c Set. ¼" size has snap end bearing.



I HANDLE THE SKUTTLE LINE OF HUMIDIFIERS BECAUSE THERE'S NO TRICK GADGETS OR BREAKABLE PARTS TO SERVICE • • •

YES sir, Mr. Dealer, you've got the right idea if you want to show a profit on your humidifier line this year, eliminate service calls, step up sales, and add to your profits. It's the smooth and efficient operation of Skuttle's completely automatic humidifiers that has made them so popular with furnace dealers throughout the country. They know that a Skuttle once sold will give years of trouble free operation.

80% of the furnace manufacturers also require Skuttle's superior performance and trouble free operation because they specify Skuttle humidifiers as standard equipment on their units, year after year.

But don't take our word for this, let us send you a unit today and you can prove to yourself what Skuttle can do.

• • •

The Skuttle Automatic Humidifier Series 200 is 18" to 30" long, 2" deep and 3" wide with ceramics that extend beyond the pan to give proper humidification. Can be easily installed in the plenum chamber of any warm air furnace.

MANUFACTURERS:
Special sizes can be made to your specifications.

SKUTTLE *Sales* COMPANY

Air-Conditioning Equipment

999 FRANKLIN ST. • • • DETROIT, MICHIGAN

New Literature . . . .

For your convenience in obtaining copies of new Literature use the coupon on page 104.

248—Blue Print Reading for Welders

The Lincoln Electric Company, 12818 Coit Road, Cleveland, has published a book on "Simple Blue Print Reading with Special Reference to Welding" compiled and published primarily for welders. It contains information of value for anyone concerned with mechanical construction, however. Drawings are in clear, solid black lines with extra-large lettering for easy legibility.

Beginning with an introduction pointing out the importance of being able to read blue prints, Simple Blue Print Reading takes up the following important subjects:

Simple welded object presented as a study; picture drawings of the subject; perspective drawing, isometric drawing; limitations of these and other types of picture drawings; showcase views of the subject; (orthographic projection); the 3 views necessary to give a complete showcase description; "line of sight" projection of views; bringing the 3 views to the same plane as on a sheet of paper; further analysis of point and line projection; line "alphabet"; hidden and visible outline; center lines, dimension lines, extension lines, break lines, cutting plane lines; many examples of simple and more complex blueprints with picture drawings to explain them . . . discussion of important points; dimensions, how presented, how interpreted; scale, usefulness of transformation in size by a known ratio; explanatory views (auxiliary); return to a "Showcase" viewpoint to solve the problem of presenting and interpreting slanting surfaces accurately; examples of necessary explanatory views and picture drawings to help in studying them; sections, cutting a piece for clear presentation to the reader; broken views, omitted parts of drawings; screw thread interpretation; study of appearance, discussion and example; development of the basic weld symbol, the arrow, method of indicating weld position; method of indicating type of weld, size and shape of weld, length of weld and other necessary information; analysis of complete weld symbol and its use; sections of over 35 different welds with their corresponding symbols; examples of the previous instruction drawings with welding symbols added; special symbol instruction drawings, discussion.

A comprehensive explanation gives the student a clear understanding of various symbols used in drawing of different types of welded joints, including butt, corner, fillet, lap, etc. The illustrations include practical examples of drawings of a number of machine parts.

Price is 50c per copy, postpaid anywhere in the U. S. A., 75c elsewhere.

◆

249—V-Belt Data Book

The B. F. Goodrich Company, Akron, Ohio, has just published a new 170-page "V-Belt Data Book," available upon request.

The book gives alphabetical listings of belt requirements for water pumps, stokers and oil burners, air compressors, buffing machines, floor sanding machines, and garage and shop equipment.

These listings give the manufacturers part number, the Goodrich belt number and its size in each case.

In addition, 24 pages are devoted to numerical group listings of belt sizes, and eight pages to a numerical list of belt dimensions both for V and flat belts.

◆

250—Arc Welding Training Course

The Hobart Brothers Company, Hobart Sqnare, Troy, Ohio, has published a 218-page book on arc welding. The book is used in the Hobart Welding School as a text book covering practical lessons in arc welding. Price 50c.

KNOW ALL MEN

in the

HEATING

AIR CONDITIONING

and

VENTILATING BUSINESS

that

Asbestos Protected DUX-SULATION

is the accepted and approved insulating material for covering ducts to preserve and maintain temperatures . . . for lining ducts to prevent noise and sound travel . . . to save fuel . . . to prevent condensation . . . to balance system operation . . . to reduce insulation costs . . . to simplify application . . . to improve appearance.

DUX-SULATION is protected in U. S. and Canadian Patent Offices.

●

Write office nearest you for details.

GRANT WILSON, INC.
4101 West Taylor Street CHICAGO

PLANT RUBBER & ASBESTOS WORKS
537 Brannan Street SAN FRANCISCO

AIR CONDITIONING UTILITIES CO.
8 West 40th Street NEW YORK

ATLAS ASBESTOS CO., LTD.
110 McGill Street MONTREAL, CANADA

New Literature . . . .

For your convenience in obtaining copies of new Literature use the coupon on this page.

251—Electro-Matic Air Filter

American Air Filter Company, Inc., First and Central Avenue, Louisville, Kentucky, is distributing Bulletin 250-C, covering the improved Model C Electro-Matic air filter. The Bulletin describes and illustrates the construction and operation of the Model C in terms for either engineer or layman. Diagrams and cut-away sections show how electrical precipitation and automatic air filtration have been combined in a compact self-contained unit.

◆

252—Steel Furnaces—Winter Air Conditioners

Dowagiac Steel Furnace Company, Dowagiac, Michigan, is distributing a spirally bound colorful new catalog. The book is indexed for their hand-fired steel furnaces, oil-burning units, blowers, gas burning units, stoker furnaces and stokers, cast pipeless furnaces and room heaters, and accessories. Copies are offered to legitimate dealers in any city not already covered by a Dowagiac agency.

◆

253—All Purpose A.C. Welder

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept 7N20, offers Catalog Section 26-325—a new four-page illustrated leaflet describing the Type WT-4 portable modern A.C. welder, designed for all-around general utility service and production welding. These welders have a range of from 20 to 250 amperes and work off of 220 or 440 volt A.C. current.

The leaflet contains a description of the features of this welder—its current adjustment scheme, with 27 current steps; its safety features, including low open circuit voltage and built-in circuit breaker protection. Illustrations of the different parts aid the descriptions.

The complete set of accessories furnished with the welder is listed and shown pictorially. Complete electrical specifications, which include efficiencies, kva input, power factor, etc., for various load current settings are given. A table of weights and dimensions, and complete ordering and price information complete the leaflet.

◆

254—Warm Air Heating Equipment

The Excelsior Steel Furnace Company, 118 South Clinton St., Chicago, is distributing a wall poster, illustrating the complete Excelsior line of warm air furnaces—both steel and cast construction, gravity and forced air types, coal-fired as well as oil-burning, and including the newly-developed two-section Unique oil burning air conditioner. Information for sizing registers for air conditioning is included.

FOR YOUR CONVENIENCE

American Artisan, 6 N. Michigan Ave.
Chicago, Ill.

Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature." (Circle numbers in which you are interested):

207	208	209	210	211	212	213
214	215	216	217			
230	231	232	233	234	235	236
237	238	239	240	241	242	243
244	245	246	247	248	249	250
251	252	253	254			

Name .....

Company .....

Address .....

Are you Manufacturer———Jobber———Dealer———

KEEP YOUR CUSTOMER LIST ALIVE! SELL THE NEW

RESEARCH (WALTON) AIR FILTER

Now's the time to get in on profitable air filter replacement business with RESEARCH (Walton) AIR FILTERS. They're top-notch performers, they offer longer margins to dealers, and they provide lower replacement costs to consumers. You'll like the high quality and efficiency of RESEARCH (Walton) Air Filters . . . you'll like the EXTRA EASY PROFITS!

Write for FREE DEALER HELP ADVERTISING PLAN

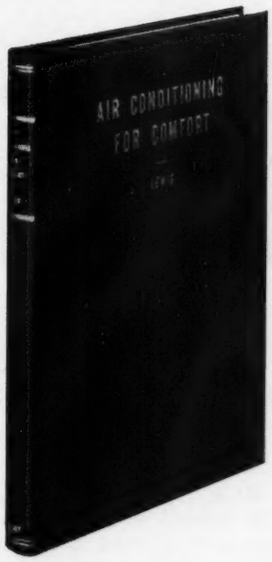
A complete advertising plan of dealer helps is yours . . . including post cards, window streamers, radio spots, newspaper ads . . . a plan that promotes the "Fall Furnace Check-Up" idea to increase profits. Write for details.

- STOPS MORE DUST
- HOLDS MORE DUST
- LOW RESISTANCE TO AIR FLOW
- EASY SERVICE

RESEARCH (Walton) AIR FILTERS are available in various types—fibre frame, wire frame, and re-fil-able. Illustrated is the new type WA RESEARCH (Walton) Re-Fil-Able HINGED GRID FILTER for low cost replacements. Write today for new descriptive folder that gives details on all RESEARCH AIR FILTERS.

RESEARCH PRODUCTS CORP., MADISON, WISCONSIN, U. S. A.

KNOW AIR CONDITIONING



Send Today
for
Samuel R. Lewis'

"AIR CONDITIONING FOR COMFORT"

Third Edition
288 Pages—Illustrated
$2.50

Here is a book that presents—in simple, readily understandable form—every kind of information necessary for an accurate and thorough knowledge of air conditioning principles, equipment, and practices. Written by S. R. Lewis, a widely-known consulting engineer who has been active in air conditioning work for more than thirty years, it deals with all angles of the air conditioning subject from the practicing engineer's viewpoint. The designing procedures explained in the book are, for example, in every detail the same procedures employed today by the author's own organization.

Featuring this third edition are several entirely new chapters on phases of the subject not previously treated, including noise control, air conditioning measurements, air conditioning standards, fire protection codes and operating suggestions. Brand new designing examples are also used, together with new forms for recording the design data, the proper filling-in of which is explained step-by-step.

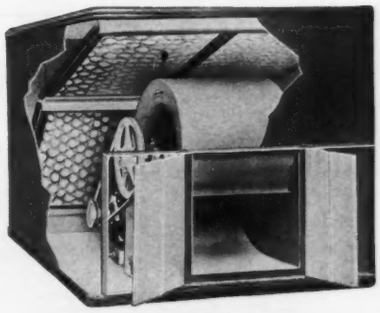
OF VALUE BOTH AS
A REFERENCE AND TEXT

Engineers in air conditioning will find the new "Air Conditioning for Comfort" invaluable as a reference book, while salesmen, students, and others may rely on it to give them a clear knowledge of fundamentals, and of the latest air conditioning methods and equipment.

Send for a copy today. We know you will consider this volume the most readable and complete book on the air conditioning science you have yet seen. You will risk nothing in ordering a copy, for you will be privileged to return it for a refund if for any reason it should prove unsatisfactory. Order your copy now.

KEENEY PUBLISHING COMPANY
6 N. Michigan Ave. Chicago, Ill.

Refinements lend new sales appeal to time-tested unit.



REX AIR-PAK

with automatic by-pass louvers.

You are overlooking a valuable selling feature—and an effective means of licking a coal-fired, forced-air job—if you have never sold or installed a REX AIR-PAK with Automatic By-pass Louvers. When the blower stops the louvers open and permit gravity circulation to continue, thus preventing a too rapid fluctuation in room temperatures and affording furnace protection.

Recommended for all coal furnaces.

New improvements include durable steel louver panels replacing the asbestos type formerly used, hammered-style, baked enamel finish that is pleasing to look at and easy to clean, and simpler cabinet construction.

New catalog for 1941 now ready.

Write for sheets which give more complete details about the advantages of automatic louvers and other REX AIR-PAK units. Ask, too, for samples of sales promotional materials and the name of our nearest distributor.

Air CONTROLS INC
Div. of
The Cleveland Heater Co.

1937 W. 114th St. Cleveland, Ohio

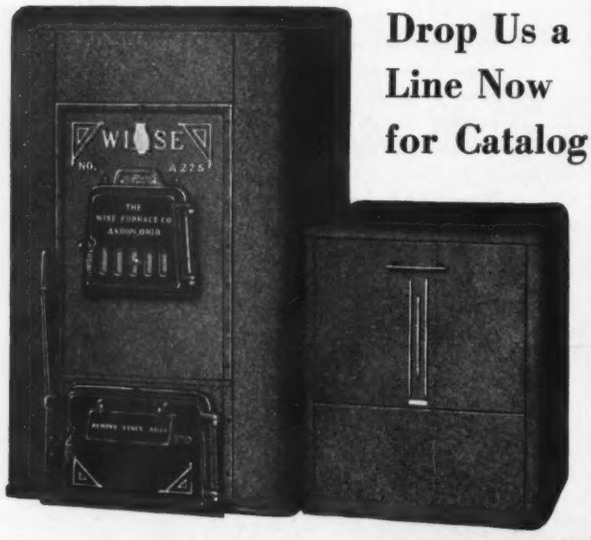
AN INVITATION TO BIGGER AND BETTER PROFITS THIS FALL

SELL WISE AIR CONDITIONING and GRAVITY FURNACES...

You really don't need an invitation to go after bigger and better profits, but we thought you might like to know that they come easier and stay longer when you specify and install WISE units. Gravity is the time-tested field for real volume selling of heating plants . . . and air conditioning installations offer a chance to make some handsome profits.

Wise units are the answer here. Their peerless performance and tough, efficient construction make them good for years of heating comfort.

We've plenty of literature and sales assistance ready for you. Consider this your invitation to write for it!



Drop Us a Line Now for Catalog

WISE FURNACE COMPANY
AKRON ● OHIO

Gillen Forms Company

J. L. Gillen, formerly vice-president and general manager of Lochinvar Products, has formed the J. L. Gillen Company, with offices and factory in Dowagiac, Michigan, to make a complete line of automatic oil burning furnaces and water heaters. This line is now being developed and a field test being made so that around January 1st the company will be able to make a formal announcement to the trade. Mr. Gillen has been with the Lochinvar Corporation 5 years, having started with that company.

◆

Hayes Joins Olsen

C. A. Olsen announces that Edward P. Hayes has joined The C. A. Olsen Manufacturing Company, Elyria, Ohio, as vice-president. The C. A. Olsen Manufacturing Company manufactures "Luxaire" furnaces and air conditioning units.

Edw. P. Hayes

For many years Olsen and Hayes were associated with the Fox Furnace Division of American Radiator & Standard Sanitary Corporation, of which Mr. Olsen was president and Mr. Hayes was in charge of sales promotion and sales.

This announcement indicates a resumption of this association after an interlude during which Hayes served as vice president of May Oil Burner Corporation of Baltimore.

The C. A. Olsen Manufacturing Company has recently placed on the market a new line of gas fired furnaces and air conditioning units.

NEED A REPAIR PART?

. . . . . if you do, you'll save yourself time and money by ordering it from Capitol's reliable stock. Parts are guaranteed to fit and the quality of Capitol stock has been proven time after time in countless installations.

Write us today for free catalog. You'll get it at once!

CAPITOL HAS IT!
CAPITOL FURNACE AND STOVE REPAIR CO.
443 E. Washington St., Indianapolis, Ind.

Tenth Annual Sales Conference

Hart & Cooley Manufacturing Co., Holland, Michigan, held their tenth annual sales conference late in August. The program included an inspection tour of the plant, a

talking motion picture entitled "The Autopsy of the Lost Sale," luncheon at the Holland Country Club, introduction of new products with samples on display, a discussion of the price set-up to the trade, and a demonstration and discussion of air distribution with new type registers. The final demonstrations were a series of smoke tests.

Automatic Coal Heat Display

L. G. Briggs, president of the Midwest Stoker Association, retail stoker cooperative organization headquartering in Chicago, announces that arrangements have been completed for a permanent stoker and automatic coal heat display on the Home Building Exhibit floor in the Merchandise Mart, Chicago.

The exhibit will simulate a modern basement and will utilize different types of wall board construction showing practical application to basement recreation and living rooms.

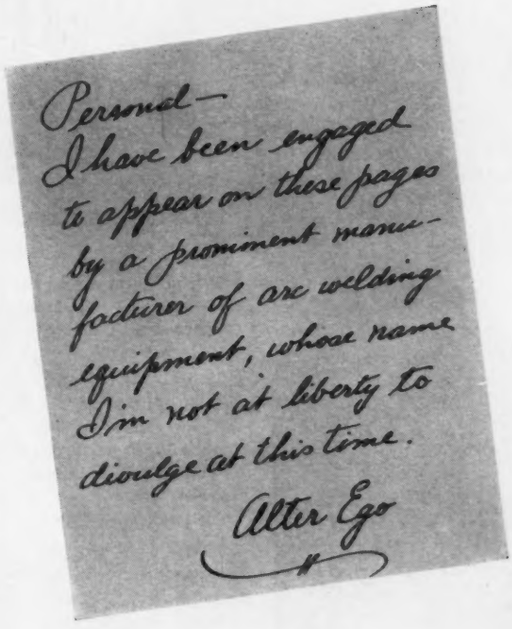
The Chicago Coal Merchants Association is cooperating. The room will be known as the "Automatic Coal Heat Room."

HERE'S WHY YOU'LL FIND THARCO IN MOST NEW FURNACES

Furnace manufacturers can depend on THARCO

Good furnace cement, properly applied, is vital to the success or failure of any furnace. Realizing this, furnace manufacturers prefer a cement like Tharco for mounting new furnaces. In the trade, Tharco is famous for its high heat-resisting qualities, its long life and plasticity at high temperatures which allows it to expand and contract with the heating and cooling of the furnace. Tharco "butters on" easily. Try it on your next job.

MANUFACTURED ONLY BY
THE ARMSTRONG COMPANY
DETROIT DALLAS CHICAGO

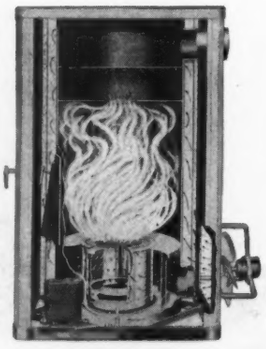


2 Reasons Why The MONOGRAM Oil Furnace is More Efficient

1 • ONLY UNIT OF ITS KIND WITH A DOUBLE BAFFLE

2 • OPERATES ON .02 DRAFT

These are only two of the many reasons why MONOGRAM oil burning furnaces offer you efficient and trouble-free heating service. The MONOGRAM Turbulent Flame "Vaporizing" Burner produces a shorter, wider flame that completes combustion in the heater, making the use of a double baffle possible. This creates a lower heat zone, which heats the air quicker, lower down, causing a faster circulation of a greater volume of heated air. It also stops the rush of warm air up the chimney—lowers flue temperature—increases efficiency—lowers operating cost.



MODEL NO. 100

A .02 draft will carry the pilot or low flame on the burner. Mechanical draft is provided for high fire, eliminating complaints from wide chimneys.

75,000 B.T.U.—Booster Gravity
90,000 B.T.U.—Booster Gravity
125,000 B.T.U.—Booster Gravity
90,000 B.T.U.—Winter Air Conditioner
120,000 B.T.U.—Winter Air Conditioner
150,000 B.T.U.—Winter Air Conditioner
75,000 B.T.U.—Upright Furnace
75,000 B.T.U.—Unit Furnace

The famous MONOGRAM Patented Turbulent Flame "Vaporizing" Burner operates cleaner, free from soot and carbon because a PROPER balance of both primary and secondary air is maintained, using EXACTLY the same method of combustion as used in a gas burner and obtaining the highest known operating efficiency.

Order a sample now—give it a good tryout this year—compare its performance with others and next year you too will want to feature MONOGRAM.

43rd Year of Quality

THE QUINCY STOVE MFG. CO.
QUINCY, ILLINOIS

With the Manufacturers . .

General Controls in New Home

General Controls Co., Glendale, California, manufacturers of pressure, temperature, and flow controls, has moved into a new and permanent factory on an eleven-acre site at 801 Allen Avenue.

The new plant will house the general offices, research and testing laboratories and complete and new manufacturing facilities. The Los Angeles screw machine division of General Controls will also be incorporated in the new plant.

Kingsland Vice-President Perfex

Julius K. Luthe, President of the Perfex Corporation, Milwaukee, announces the appointment of George D. Kingsland as vice-president in charge of sales for its Eastern Division.

Geo. D. Kingsland

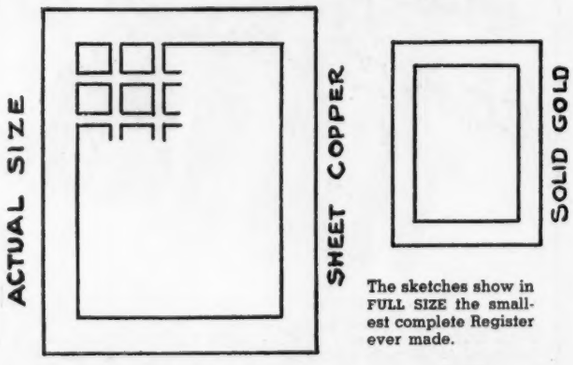
During his 20 years' association with the control industry, Mr. Kingsland has pioneered many new ideas on controls and control systems. An imposing group of patents in his name is evidence of this accomplishment.

Mr. Kingsland is a member of the American Society of Heating and Ventilating Engineers and has been prominent in the society's activities on controls and control systems. He has also been identified with similar activities in the National Warm Air Heating and Air Conditioning Association and National District Heating Association.

GRILLE HEAD QTRS OF U S A

These letters mean a great deal to all Americans. They also stand for Uniform Standardization Argument which is often carried too far.

Individuality counts a lot in the Architectural treatment of your home and office. ("ASK YOUR ARCHITECT.")



The sketches show in FULL SIZE the smallest complete Register ever made.

It is a long jump from the sketch shown to a Register eighteen feet long which is our largest on record.

Our line covers all Designs, all Materials and all Shapes.

No Register or Grille too large or too small for
REGISTER & GRILLE MFG. COMPANY, INC.
70 BERRY STREET, BROOKLYN, N. Y.

Milcor National Defense Plan

The Milcor Steel Company, Milwaukee, manufacturers of steel building products and accessories, announces that it will do its part for national defense by matching the army pay envelope, dollar for dollar, for any of its employees who are called to the colors under the Selective Service law.

"Many employees have obligations of such a nature that the regular pay of enlisted men (as distinguished from officers) during this period may involve substantial sacrifices," Earl A. Tanner, president, explained.

"As to men subject to first call in the National Guard or under the Selective Draft Law, it is the intention of the company to supplement the income of such employees by a monthly payment of an amount equal to the base army service pay.

"During this same period, the company will maintain in effect the group life insurance which employees may have at the time of their enlistment. During the year that the employees will be trained in military service, they will also retain their seniority rights."

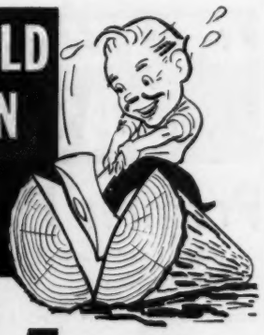
◆

Automatic Fuel Burning Equipment Moves

Howard R. Stevens, manager of Automatic Fuel Burning Equipment Company, distributers for Will-Burt bituminous stokers, Freed authracite stokers, Canton ram feed stokers, and Chicago Spreader stockers, as well as American Furnace Company and the R & I refractory materials, announces that they are now settled in their new and larger quarters with office, show room, shop and warehouse all under one roof at 7 St. Ann Street, Jamaica Plain district, Boston.

The Automatic Fuel Burning Equipment Company are also dealers for Motorstokor in the greater Boston area, with a stock of parts at all times.

THIS GREAT FIELD IS WIDE OPEN FOR YOU!



NEW PROFITS

$39.50

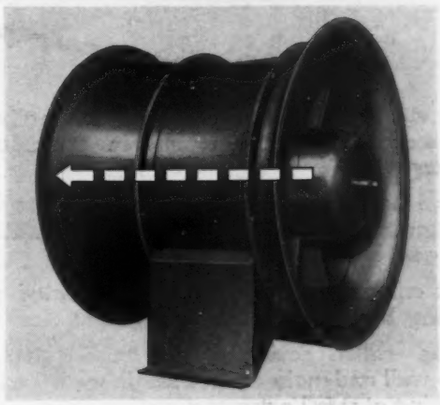
People are just beginning to be "HUMIDIFIER CONSCIOUS." And the HUMIDOME has exceptional features, plus a "STORY TO TELL" that combine to make it a tremendous seller—offering you quick, worth-while profits. Don't delay. Write immediately for complete particulars and liberal dealer discounts.

Humidome NATIONAL ADVERTISING IS JUST BEGINNING

Address:
THE HARRY ALTER COMPANY
1728 S. Michigan Ave. Chicago, Ill.

When cramped space conditions call for

STRAIGHT-LINE AIR FLOW



Check the Advantages of

This AXIAL FLOW FAN

(with straight line air flow)

Every once in a while you probably encounter an installation that requires quiet large capacity air delivery through ducts—yet space will not permit the use of a centrifugal housed type fan. The BUF-FLOW Axial Flow Fan is the answer! It is different from many fans for this reason: its design employs special directional guide vanes which effect the propelling of air in an AXIAL direction. No energy is wasted through "air churning." Hence greater efficiency and marked power savings. And this fan maintains its air-moving capacity at a slower speed—just another reason for quietness in operation . . . Can be used as a blowing or an exhausting unit. Requires a minimum of space for installation . . . CANNOT BE OVERLOADED AND BURN OUT MOTOR. Better send for full details! Ask for Bulletin 3229.

Stop That Noise!
NOISE ABATEMENT WEEK
Oct. 21-26

BUFFALO FORGE COMPANY
497 Broadway Buffalo, N. Y.

Branch Engineering Offices in Principal Cities
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buf-flow" Limit-Load AXIAL FLOW FAN

THESE ARE THE FEATURES YOU WANT IN A FLOOR FURNACE

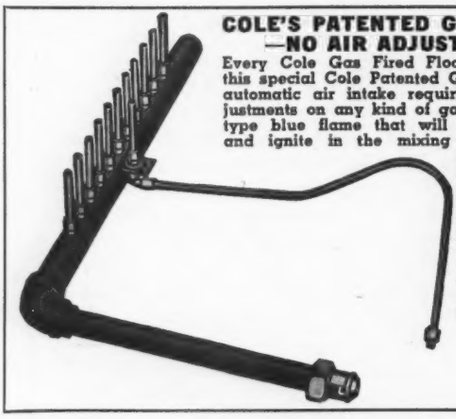
★ Full vitreous porcelain enamel inner heating unit, engineered to give the utmost in durability and efficiency.

★ Large heating surface and the long delayed flue travel for maximum heat from natural, artificial or mixed gas.

★ Unit crimped and sealed by a patented process providing best gas-tight and stay-tight construction.

★ Three walled casing of galvanized steel—inner double wall and main outside single wall. Full porcelain casing at small extra cost.

★ Combination safety pilot and automatic thermostatic control available at small extra cost for all Cole Gas Fired Floor Furnaces in the 20-30-40 series.



COLE'S PATENTED GAS BURNER —NO AIR ADJUSTMENTS

Every Cole Gas Fired Floor Furnace has this special Cole Patented Gas Burner with automatic air intake requiring no air adjustments on any kind of gas. Full Bunsen type blue flame that will not flash back and ignite in the mixing chamber. The Cole Burner produces a tall, semi-luminous flame about 8 inches high heating the entire area of the combustion chamber, uniformly, economically, quickly.

Cole Gas Fired Floor Furnaces are approved by the A. G. A. Installation is extremely simple. Furnaces are hung from floor joists in buildings with or without basements. For full or auxiliary heating, Cole Gas Fired Furnaces give greatest satisfaction at a most reasonable first cost and continuous low operating cost. Write for full details today.

AMERICAN GAS ASSOCIATION · APPROVED · (CONFORMS WITH NATIONAL SAFETY REQUIREMENTS)

COLE HOT BLAST MANUFACTURING CO.
3108 WEST 51st STREET CHICAGO, ILLINOIS

With the Manufacturers . . .

Sales School for Master Kraft Dealers

Harvey-Whipple Incorporated, Springfield, Mass., held their annual sales school during the month of August and early September. These classes were conducted by the factory and afforded dealers a complete course in the latest methods of successful specialty selling. Each session

was inaugurated with a short address by Ray G. Whipple, treasurer and general manager, on oil burner standards, and then turned over to T. A. Hodgdon, advertising manager, for a sales course which included

How to find new prospects
How to remember the forgotten prospect
How to present your case
How to melt the ice out of price

Each session was also addressed by Walter O. Harvey, president. At the conclusion of the sales course, dealers took part in discussions and question sessions. George H. Bork, vice president and chief engineer, gave a series of lectures and took part in interesting tests and discussions covering latest engineering developments in the oil heating field.

BUILT to LAST LONGER!

Premier Furnace Cleaner

Its rugged construction adds years to the useful life of this Premier Furnace Cleaner—and extra use means extra profit possibilities. One man can operate it—and it weighs less than 50 pounds, so it is easily portable. It does a quick thorough job under all conditions—since it cleans all types of heating equipment, cold or under fire.

New Improved Model—
Completely Equipped
⅝ Horsepower 69.50
1 Horsepower 89.50

Complete Chimney Cleaning Equipment Only $9.00

ELECTRIC VACUUM CLEANER CO., INC.
1734 Ivanhoe Road · Cleveland, Ohio

With the Manufacturers . .

Janette Appoints Boston District Agent

Janette Manufacturing Company, 556-558 West Monroe Street, Chicago, has appointed Stearns, Perry and Smith, 51 Chardon Street, Boston—telephone Capital 3930, district agent for the Boston territory.

◆

Third Lennox Factory at Columbus

A third Lennox factory is now being built at Columbus, Ohio, to give better service to Mid-Western and Southern dealers with faster deliveries, lower freight rates and quicker engineering service, and is scheduled for full-line production in January, 1941.

◆

Plandaire Representatives

Lee Eils, vice-president and sales manager of Plandaire, Inc., P. O. Box 7350, Oakland Station, Pittsburgh, announces the appointment of three sales representatives who will have exclusive sales rights for Plandaire Kno-Draft high velocity spun aluminum ceiling type air terminals in their respective territories:

Air Conditioning Utilities Company, 8 West 40th St., New York City.

Glegge Thomas, 1426 G St., N.W., Washington, D. C.

Hucker-Pryibil Company, 1700 Walnut St., Philadelphia, Pa.

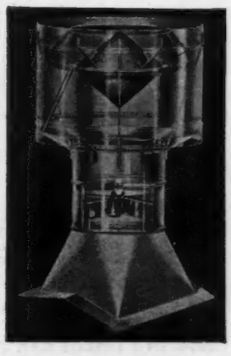
◆

A.G.A.E.M. Bulletin

Association of Gas Appliance and Equipment Manufacturers, 60 East 42nd St., New York City, is distributing No. 7 of Vol. 5 (July-August, 1940).

BURT Ventilators

Turn Fresh Air Into Money



You can make money selling Burt Ventilators; for in every type of building—industrial, commercial, or other—you can show how they make money for the owner by the better ventilation they effect. With the complete Burt line, you can offer the most advanced design; and on either public or private work, you are in position to meet every specification, quote favorable prices and make a profit.

THE BURT MFG. CO.
ROOF VENTILATORS • OIL FILTERS
EXHAUST HEADS
301 Main St., Akron, Ohio

SEND FOR CATALOGS
Burt Engineers are glad to help on plans

"MAYBE YOU'RE MISSING SOMETHING WHEN YOUR CUSTOMERS DON'T GET MEASURED MOISTURE"

THERMO-DRIP CONTROLLED EVAPORATION BOOSTS REPUTATIONS . . . GETS YOU MORE JOBS . . . BRINGS YOU EASY PROFITS!

IN MOST CASES homeowners are quick to talk up your good furnace jobs. That's desirable word-of-mouth advertising that brings new customers to your shop and helps you make more money. For this reason you can't take chances with your reputation when you install air moisteners on furnaces! Humidifiers that fail to provide the amount of moisture necessary for bodily comfort at normal room temperatures can cause homeowners, unaware of the fact that a lack of *proper* moisture may be responsible for discomfort, to heap blame on an otherwise good furnace job. Humidifiers that do that act as a brake on customer good-will.

Trust THERMO-DRIP—the self-regulating drip-feed humidifier—to keep your customers satisfied and loyal. Its heat control feature is your assurance that it gives homeowners *measured* moisture . . . moisture that is kept constantly in balance with temperature. It discards the principle of humidifying with brimful water pans . . . does away with mechanical and electrical parts . . . lets you avoid the headaches and grief from limed-up valves and from rust and corrosion.

Demand THERMO-DRIP humidifiers on the furnaces you buy, or get the whole story about this efficient humidifier now from your wholesaler or from us.

AUTOMATIC HUMIDIFIER CO.
CEDAR FALLS • IOWA

THERMO-DRIP
Automatic HUMIDIFIER

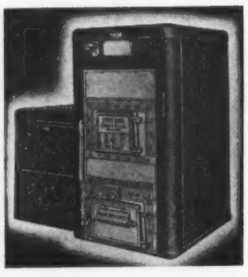
Last month was the Biggest in our history...

YOURS TOO?

LAST MONTH WAS THE BIGGEST SEPTEMBER IN CUR HISTORY! That's not all . . . this season is already certain to be the very biggest in our history! Why? Simply because Front Rank and Mellow heating equipment are real quality products . . . sold at a fair price. For 52 years these products have been winning favor with building public acceptance. Now, YOU can cash in. Write for details.

FRONT RANK AND MELLOW WARM AIR

Complete line of Warm Air Heating Units!

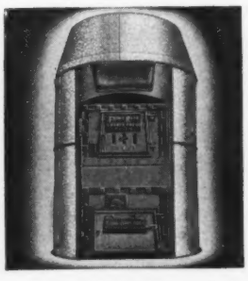


"FRONT RANK" Winter Air Conditioning Furnace

The latest improvements that contribute to health, comfort, convenience and economy are embodied in this attractively finished furnace. Priced to sell in competition.

"FRONT RANK" Steel Furnace

Tested and proven in actual service by more than 350,000 owners, over a period of 52 years! Designed to last a lifetime. YOU, as a dealer, can cash in on the reputation FRONT RANK has established.



"MELLOW" Cast Iron Furnace

Engineered to distribute maximum heat with minimum firing. Leak proof to prevent gas or smoke from escaping. EXTRA HEAVY, over-sized automatic humidifier. The favorite of thousands Popular price.

★ **ACT NOW . . . there's still time for you to join our rapidly growing dealer organization and get your share of the 1940-1941 profits. WRITE AT ONCE FOR COMPLETE INFORMATION.**

FURNACE DIVISION

Liberty Foundry Co.

2500 OHIO ST. • SAINT LOUIS, MO.

Kruckman Washington Letter

(*Continued from page* 38)

to a large extent upon the USHA. Congress is not deeply impressed with the abilities of the men who conduct the business of the USHA and therefore is decidedly unwilling to trust defense housing to the organization. The USHA, however, has some stubborn friends close to the White House and the influence of those friends makes it difficult to eliminate the USHA entirely. Congress itself would like to place the defense housing program and spending under the supervision of Stewart McDonald, FHA Administrator. McDonald is a rough-and-tumble Scot who impresses them with the idea that he gets things done. And he is an expert interdepartmental politician. But Mr. McDonald's agency is primarily a banking institution, and in theory, at least, is not a building agency. Needless to say it has a very competent staff of practical and skilled construction experts.

The third equation is the personality of Administrator John M. Carmody, head of the Federal Works Agency. He knows building and he had the USHA in his group and he has a special national defense organization. As the bill is now amended the $150,000,000 will be turned over to Carmody and Carmody will be empowered to distribute it to the various agencies he may decide are competent to do the housing job. The argument is that the actual supervision of the several building operations would thus be scattered around among a number of agencies, each of which has a perfectly competent organization, and each of which could separately do an individual job better and more swiftly than if it all was handled by one agency.

If Carmody is placed at the head of all civilian building operations for the national defense it is very probable that much work will be done by the Public Buildings Administration which is part of his group. This Government

PROTECT YOUR FUTURE *Sales*

In your business, as in others, future sales depend on satisfying present buyers. For every customer has friends and neighbors; and if one of them becomes dissatisfied with the heating or air conditioning plant you install, however unjustly, that is bad business for you.

Disgruntled customers come, sometimes, from inefficiency of the actuating element of the control—perhaps only a slight leakage; or a little weakening under unexpectedly high heat. The results may easily be wasted fuel, uneven house temperatures, possibly injury to the heating plant. Certainly they will include higher service costs to you; and perhaps the loss of future sales.

All these evil results can be avoided by specifying Chace High Temperature Thermostatic Bimetal as the thermal responsive element of your controls. Chace Bimetals cannot leak . . . and will not weaken. They have been proved by many years service to be wholly dependable for the full life of the installation. Protect your future sales by insisting on Chace.

Specify Chace

Control manufacturers are invited to consult us for type of Chace Thermostatic Bimetal best suited to meet specific demands.

W. M. CHACE CO.
1601 BEARD AVENUE
DETROIT, MICHIGAN

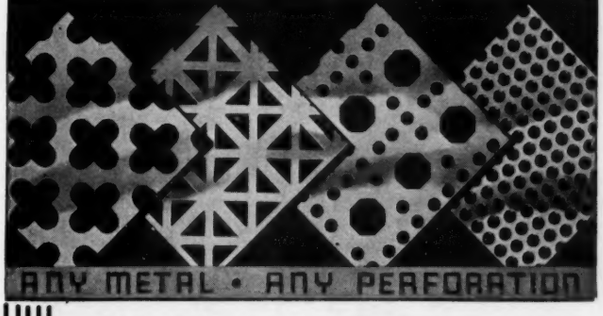
agency has hitherto been in charge of all Post Office construction, and has built the majority of other Government buildings for civil agencies in all parts of the country.

If you have any inquiry about heating, duct work, air conditioning connected with Public Buildings operations, write to Donald Cameron, U. S. Public Buildings Administration, Washington, D. C. If you wish to make inquiries about Army work, write to John R. Gramm, mechanical engineer in charge of Interior Utilities Section, Quartermaster General's Construction Division, Washington, D. C. The expert in charge of heating, duct work, and air conditioning is A. L. Sherman, also in the Interior Utilities Section. If you wish to discuss procurement and purchase problems for the civil jobs, questions about contracts and bargains, write G. C. Salomone, senior purchasing officer, Procurement Division, Treasury, Washington, D. C. If you think you need a friend at the National Defense Advisory Council, write to W. V. Kahler, Assistant Director of Construction. He came to Washington from the job of Chief Engineer of the Bell Telephone Company of Illinois. He is directly in charge of heating, plumbing, duct work, air conditioning and similar problems in the national defense economy.

Heating Industry Laison Committee

The industries themselves are represented by a liaison committee, appointed at the suggestion of Mr. Kahler, headed by George Hoffman of the Crane Co., Chicago, and consisting of 25 persons who represent the producing elements in the heating, piping and air conditioning industries. The local representative for the committee is E. G. Rose, 1225 Eye Street, NW, Washington, D. C. Mr. Kahler suggests that any industrial group that feels it is not adequately represented in relations with the national defense business should proceed to organize a liaison committee. The committee should be representative of the whole industry, including the primary as well as the corollary elements, and it should meet regularly with Mr. Kahler, or some other member of the National Defense

PERFORATED METALS
Industrial and Ornamental



Industrial Perforations include all sizes of round, oblong, and many special shaped perforations, for Screening, Grading, Draining and Guarding purposes. Our line is very complete.

Ornamental Perforations are used in Architectural Grilles, Radiator Enclosures, Metal Furniture, Cabinets, Stoves, etc. In addition to the standard shapes we have many exclusive and attractive designs suitable for different uses.

H&K workmanship is unsurpassed.

Write for prices and other information.

The Harrington & King PERFORATING Co.

5649 Fillmore St., Chicago, Ill. New York Office, 114 Liberty St.

The New no. 250 CAMPBELL NIBBLER

cuts stock up to 72 inches wide

cuts in all directions

has three speeds and adjustable stroke

● The new, improved machine has a very deep throat that permits cutting ¼-inch mild steel and 3/16-inch stainless steel up to 72 inches wide. Cuts are made in any direction, while the operator keeps a two-hand grip on the piece.

The stroke may be adjusted in less than a minute for cutting any thickness from ¼-inch to very thin. Thin templates may be used on any thickness.

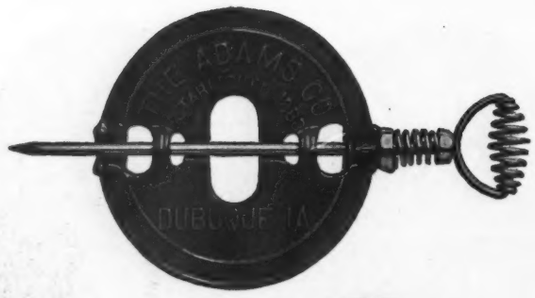
The speed can be changed instantly to 350, 500 or 800 R.P.M.

BUY ACCO QUALITY *in Campbell Cutting Machines; Wright Hoists and Trolleys; Page Welding Electrodes; American Chains; Tru-Lay Preformed Wire Rope; Reading-Pratt & Cady Valves; Page Wire Fence.*

ANDREW C. CAMPBELL DIVISION
Designers and Builders of Special Machinery
BRIDGEPORT, CONNECTICUT

In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.



Above: Diamond Smoke Pipe Damper; sharp piercing point with four cutting edges, rod may be used as punch on heavy furnace pipe; bright nickel plated ferrules and coil handle; extra heavy spring; steel rod; heavy cast reversible blade. Sizes from 3 to 18 inches.

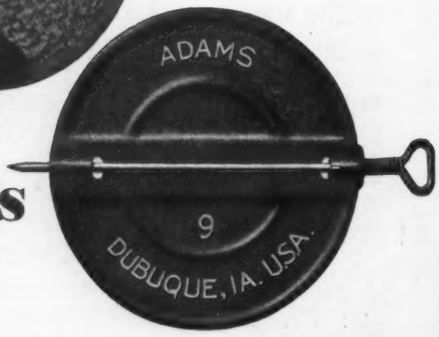
Right: The Diamond Smoke Pipe Damper with cast rod and iron handle for use in extreme heat. Sizes from 7 to 18 inches.

Above: No. 3 Adams Furnace Check Damper, reversible for vertical or horizontal smoke pipe, also in black lacquer finish; sizes 5 to 10 inches.

Left above: No. 1 Adams Furnace Check Damper (end check and collar) with full size openings in black lacquer finish; reversible for vertical or horizontal smoke pipe. Sizes 6 to 12 inches.

Left: No. 4 Adams Furnace Check Damper in black lacquer finish; sizes 6 to 12 inches.

Left: Adams Steel Damper Clip, no rivet and **below:** The Adams Sheet Metal Damper in 6 to 14 inch sizes. Write today for catalog pages and descriptive material. Buy Adams quality for every job.



BUY ADAMS
Known Quality

Order Adams Dampers for proven performance.

Manufactured by

THE ADAMS COMPANY

ESTABLISHED 1883

DUBUQUE, IOWA, U. S. A.

Advisory Commission, to maintain full mutual awareness of developments.

By the first of October it is estimated the awards and contracts for national defense building construction will exceed one billion dollars. It is assumed, based upon data of past experiences, that materials for heating installations, not including labor, will cost the Government 6% of the total. Piping, duct work, is calculated, not including labor of installation, another 6%. These figures come from the Public Buildings Administration. The figures are assumed to apply to the military camps, to the great Navy bases, to airports, to public buildings, and to defense housing. Some agencies intimate the figures are probably a little low.

Where Houses, Camps, Buildings Are Under Way

Housing and other building construction, either in progress or in train, centers upon the places and communities enumerated below. In some of these places new towns virtually will be created, making necessary shops, theaters, churches, schools, hospitals, and all the machinery of a community. Obviously the list will be expanded from week to week. The following list is, so far as I know, the first complete compilation of Camps, military posts, and defense plants, factories, arsenals, and centers for national defense work, active and potential, yet published:

Arkansas: Camp Robinson, Little Rock; Alaska: Anchorage, Fairbanks, Pt. Campbell; Alabama: Selma, Chickasaw, Ft. McClellan, Montgomery; Arizona: Ft. Huachuca, Ft. Tuthill; California: Mare Island Navy Yard, Stockton Air Depot, Los Angeles, San Pedro, San Diego, San Francisco, Camp Ord, San Luis Obispo, March Field, Hamilton Field, Moffett Field, Inglewood, Downey, Burbank; Colorado: Pueblo; Connecticut: Hartford, Waterbury, Bridgeport; Canal Zone: various Navy and Army communities; Delaware: various munitions factories; Florida: McCory Field, Tallahassee, Orlando, Camp Blanding, Jacksonville, Tullahoma, Tampa; Georgia: Ft. Bennings, Augusta, Camp Savannah, Columbus, Atlanta; Hawaii: Schofield

COLD RUNS BANISHED!

THE VICTOR HEAT BOOSTER

This amazingly effective device not only boosts hot air into hard-to-heat rooms, it boosts profits into the pocket of the furnace man.

The Victor Booster needs only to be set in place, plugged into any electric outlet, and out pours a rich flow of hot air—not from an overfired furnace, but from an ordinary everyday fire. Two models, floor and wall. Liberal Discounts. Write today for detailed literature and prices.

VICTOR ELECTRIC PRODUCTS, Inc.
Dept. HB-3 2950 Robertson Ave. Cincinnati, Ohio

ASK YOUR JOBBER OR WRITE DIRECT

Barracks, Ft. Shafter, Pearl Harbor; Illinois: Rock Island, Chanute Field, Chicago, East Alton, Wilmington, Ft. Sheridan, Great Lakes Naval Training Station; Indiana: South Bend, Charlestown; Kansas: Wichita, Ft. Riley, Ft. Leavenworth; Kentucky, Ft. Knox; Louisiana; Camp Alexandria, New Orleans, Camp Beauregard; Maine: Bath, Ft. McKinley, Ft. Williams, Ft. Levett; Massachusetts: Quincy, Falmouth, Boston, Camp Edwards, St. Joseph, Ft. Devens; Michigan; Pontiac, Muskegon, Detroit, Camp Custer; Maryland: Annapolis, Edgewood, Aberdeen, Hagerstown, Ft. Meade; Missouri: Robertson, Jefferson Barracks; Minnesota; Ft. Snelling; New Jersey: Ft. Monmouth, Picatinny, Bendix, Lakehurst Naval Station, Kearney, Newark, Paterson, Camp Sea Girt, Ft. Dix; New Hampshire: Portsmouth, Ft. Constitution; North Carolina: Henderson, Ft. Bragg; New York: Brooklyn Navy Yard, Platsburgh, Madison Barracks, Schenectady, Watervliet, Long Island towns, Rochester, Utica, Buffalo; Ohio: Youngstown, Ravenna, Cleveland, Hamilton County, Dayton, Cincinnati, Ft. Hayes; Pennsylvania: Williamsport, Beaver County, Philadelphia, Camp Indian Town Gap, Carlisle Barracks; Nebraska: Ft. Crook, Ft. Omaha; Puerto Rico: Borrinquen Field, Ft. Cristobal; Rhode Island: Newport Naval Station; South Carolina: Charleston, Ft. Jackson, Camp Columbia; Tennessee: Chattanooga; Texas: Corpus Christi Naval Base, San Angelo, Orange, Camp Brownwood, Camp Hulen, Ft. Bliss, Ft. Crocket, Ft. Ringold, Ft. Clark; Virginia: Norfolk, Newport News, Radford, Ft. Myer, Camp Arlington, Big Bethel, Ft. Monroe, Ft. Eustis; Washington: Bremerton, Seattle, Puget Sound Navy Yard, Spokane, Tacoma, Camp Lewis, Vancouver Barracks; Wisconsin: Manitowoc (submarine factory), Camp McCoy; Utah: Ft. Douglas; West Virginia: Camp Dawson.

Additional Army, Navy, and other National Defense Projects (places otherwise unclassified may be plants or airfields) released since first list was set in type—Alabama; Anniston; California: Berkeley, Camp McQuaide, Camp Paso Robles, Monterey, Salinas, Santa Monica; Colorado: Lowry Field; Connecticut: New Haven, Norwalk, Long Island Defense Works, New London (Navy),

REPAIR PARTS

Central can supply you in a hurry with any part you need to fit those fall and winter repair jobs. Central parts make jobs easier and easier jobs mean more profits.

FURNACE REPAIRS

CENTRAL
FURNACE & STOVE REPAIR CO.
3937 Olive St. St. Louis, Mo.

Dealers agree, today's furnace buyer demands advanced gas-fired equipment—skillfully designed, economical and durable. ☆ That is why these two partners—the AGA "Blue Star" Seal and the *PAYNE* Testing Laboratory Tag—play a big part in selling *PAYNEHEAT.* Together they testify that all *PAYNE* Furnaces have *twice* met the industry's top requirements for design, safety, performance.

PAYNE manufactures a complete lineup of house heating equipment ...backs the Dealer with generous national advertising...and helps the Dealer merchandise, sell and service his furnaces. ☆ To investigate dealer rights in your territory, write J. H. Keber, Sales Manager.

PAYNE vented gas appliances include Modern Console Heaters, Floor Furnaces, Duplex Furnaces, Forced Air Units, Zoneair Units, and Gravity Furnaces.

PAYNEHEAT
Payne FURNACE & SUPPLY CO., INC.
BEVERLY HILLS • CALIFORNIA

Control Problems . . .
A Thing of the Past

As Rare as the "Dodo Bird"

Today, Gravity-Fed Oil Burning Furnaces and Heaters use . . .

DEPENDABLE CONTROLS

One Dealer said recently—"If Retail Salesmen only realized how greatly the success of a Heating Plant in the Home depends upon efficient CONTROLS, they would build their sales story around A-P Dependable Controls!" Your final sales argument, "cinching" most Heater Sales, would be something like this:—"Here's my GUARANTEE OF SATISFACTION—the A-P Control! It's tested at the factory to feed the EXACT amount of fuel needed for every degree of heat—without danger of flooding or leakage. Gets every possible amount of heat from your fuel. It is simple to use, and thoroughly DEPENDABLE, for it rarely needs service attention. Furthermore, you can get THERMOSTATICALLY controlled heat by merely adding an A-P Heat Regulator Set. Only an A-P Controlled Heater can give you this extra convenience."

Most Manufacturers of Oil Burning Gravity-Fed Heating Units use A-P Dependable Controls—because of their Sales and Service advantages. If YOUR Line is one of this vast majority, USE these sales arguments—Dependability, Safety, Convenience, Adaptability to AUTOMATIC Control. Make the A-P Control a powerful partner in YOUR Sales! It makes profits come easier.

STANDARD CONTROLS

For Oil-Burning Heaters . . .

A-P Constant Level Oil Control with FUEL COMPENSATOR.

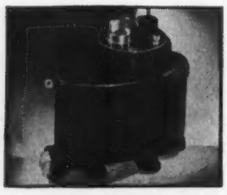
A-P Thermo Electric Heat Regulator Set for Thermostatic Control.

A-P Conversion Top with Forced Draft or Circulating Fan Switch.

For Oil-Burning Furnaces

For Oil-Burning Ranges

A-P Thermostatic Furnace Control Set—Relay Type. Also made in Heat Motor Types, or with Forced Draft or Circulating Fan Switch.



A-P Thermostatic Oven Control with Safety Constant Level Valve.

DEPENDABLE Controls and Control Sets are made for all types of Gravity-Fed Oil-Burning Heating Units.

AUTOMATIC PRODUCTS COMPANY

2452 NORTH THIRTY — SECOND STREET

MILWAUKEE WISCONSIN

Derby, Groton; Cuba: Guantanamo (Navy); Panama Canal: Ft. Kobbe, Ft. Clayton, Corozal Depot, Albrook Field, Bruja Point Field, Camp Rio Htao; District of Columbia: various Army and Navy developments in Washington, Bolling Field; Florida: Jupiter, Valparaiso, Banana River (Navy), Key West (Navy), Pensacola (Navy), Miami (Navy), Ft. Barrancas; Georgia: Albany, Augusta, Ft. Screven, Ft. Oglethorpe; Guam: Navy project; Hawaii: Hickam Field, Wheeler Field; Illinois: Springfield, Kewanee; Kentucky: Louisville; Indiana: Hammond, Ft. Wayne, Ft. Benj. Harrison; Kansas: Marshall Field; Louisiana: Barksdale Field; Montana: Missoula; Massachusetts: Indian Orchard, Holyoke, Hingham Naval Depot, Springfield, Westover Field, Brockton, Rockland, Hudson; Maryland: Holabird Army Depot, Camp Chesapeake Bay, Frederick (Army airport); Midway Island: various Navy projects; Minnesota: Duluth; Mississippi: Camp Meridan, Camp Shelby; Michigan: Saginaw, Grand Rapids, Hillsdale, Selfridge Field, Battle Creek (military airport), St. Joseph; Maine: Portland, Augusta; New Jersey: Belleville, Bloomfield, Atlantic City, Lake Denmark (Navy), Camden, Rahway; New York: Ft. Jay, Camp Upton, Camp Sandy Hook, Ft. Ontario, Mitchel Field; North Carolina: Pope Field, Winston-Salem, Henderson; New Hampshire: Franklin, Laconia; Oklahoma: Ft. Sill; Ohio: Fairfield Air Depot, Akron; Oregon: Columbia, Tongue Point (Navy), Ft. Stevens; Pennsylvania: Bethlehem, Irvine, Titusville, Erie, Nicetown, Ardmore, Pottstown, Pittsburgh, Harrisburg, Middletown Air Depot, Danville, Berwick, Youngwood, Youngstown, Allentown, Chambersburg, Mohnton, Norristown, York, Ashley, Frankfort; Philippines: Nichols Field; Puerto Rico: Ft. Buchanan, Camp Arecibo, Camp Juana Diaz, Camp Myaquez; Rhode Island: Camp Narragansett Bay, New Port (Navy), Quonset Point (Navy); Samoa: various Navy projects; South Carolina: Parris Island (Navy); Texas: Waco, Corpus Christi (Navy), Heasley Field, Ellington Field, Duncan Field, Randolph Field, Kelly Field, Nermoyle General Depot, Orange; Utah: Ogden Depot, Utah General Depot (Salt

LEADING THE FIELD—

WITH THE COMPLETE

ROUND OAK LINE

ROUND OAK dealers everywhere are leaders in their fields. For now they can extend their sales efforts over broader furnace markets and reap handsome profits . . . for today they are fully equipped to cover the entire warm air field. And you can do the same! With cast and steel furnaces, air conditioners, oil burners, and stokers, Round Oak offers you a *complete* line of highest quality. And you'll have just one company to deal with; one center of responsibility; less work. Take advantage of everything Round Oak has to offer. Cash in on all the extra sales and profits you've been missing. For complete facts write **Dept. A-10, Round Oak Company, Dowagiac, Mich.**

Moistair Blended-Iron Gravity Furnace . . . low in cost and leader in the big volume market.

ROUND OAK

of Dowagiac, Mich.

THE COMPLETE LINE OF FURNACES OIL BURNERS AND STOKERS

Lake City), Wendowver Field; Virgin Islands: Charlotte Amalie (Navy); Virginia: Dahlgren (Navy), Yorktown (Navy), Quantico (Navy), Lynchburg, Langley Field, Camp Virginia, Ft. Story, Ft. Belvoir, Richmond, Roanoke; Vermont: Ft. Ethan Allen; Washington: Ft. Worden, McChord Field; West Virginia: Wheeling, Williamson; Wisconsin: Portage, Sheboygan; Wyoming; Ft. F. E. Warren.

◆

Your Industry Needs Your Help

(*Continued from page 37*)

Our industry has behind it one of the country's longest, sustained programs of research and our recommendations can't be too far wrong. We can and do offer products and methods of installation thoroughly grounded in many years of use, under all possible conditions, and covered by complete research.

And lastly, Washington reports indicate that radiator heating is already preferred by several agencies for certain types of buildings or applications and that the volume of radiator heating let to contract is substantial.

There is no need to be greedy. There is need for selection of equipment and heating methods solely upon merit, practicability and availability.

Quiet
SELF Aligning
SELF Oiling
LAU
PILLOW BLOCKS

FOR MORE SATISFACTORY PERFORMANCE

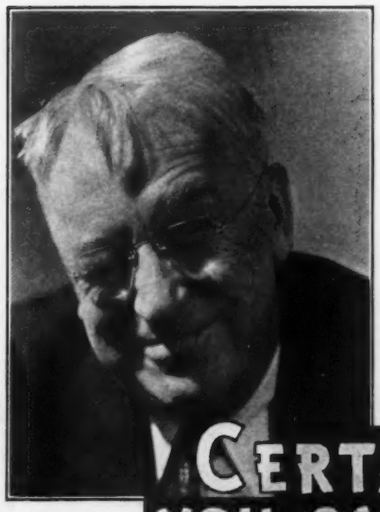
1. Oil tight steel housing.
2. Self lubricating bearing seat for collar.
3. Durex bushing feeds oil to shaft by capillary action. . . maintains constant oil film even when shaft is not rotating.
4. Large reservoir holds double amount of oil.
5. Spring acts to keep spherical surface of bearing and ring in close contact with coined surface of housing.
6. Spherical bearing surface conforms to housing contour; provides universal joint action; assures full self-aligning.
7. Long bolt slots make for easy installation.

Check these construction features . . . then you'll see why for service in the field, day after day, month after month, without complaint or failure under trying conditions, you should look for LAU PILLOW BLOCKS.

Get complete details . . . ask for Bulletin No. 22

Write THE LAU BLOWER COMPANY
2005 Home Ave. Dayton, Ohio

LAU
BLOWERS • FANS • WHEELS • PILLOW BLOCKS
THERE'S A SALES ENGINEER NEAR YOU



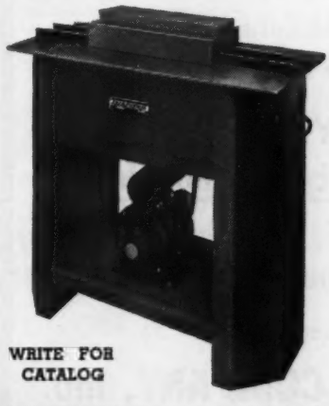
CERTAINLY YOU CAN GET ALONG WITHOUT IT!

As a matter of fact, you could still do business without snips—without a telephone—without a truck—or without a brake. You don't worry about AFFORDING them. You know you can't afford to be without them.

The same holds true of a Lockformer. One man and a Lockformer can make more Pittsburgh Locks than sixteen men working at eight brakes—hour for hour. A Lockformer conserves metal, eliminates re-squaring of sheets, does a better job, makes a Lock that's easier to assemble.

Auxiliary Rolls make Drive Cleats and Double Seam Locks with similar savings. The Power Flanger Attachment makes Right Angle Flanges on either straight or curved pieces to a radius as small as 1¾". And the tremendous reduction in fabrication costs means substantially increased profits.

We admit that you CAN get along without a Lockformer. But can you think of a single good reason why you SHOULD?



WRITE FOR CATALOG

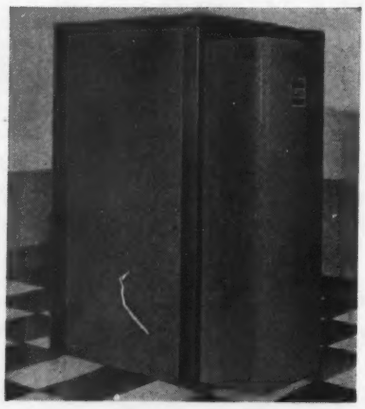
No, even first cost isn't any reason for postponement—for Lockformer prices start at $148.00 complete—and time payment plans are available.

MORE LOCKFORMERS ARE IN USE THAN ALL OTHER MAKES OF PITTSBURGH LOCK MACHINES COMBINED.

THE LOCKFORMER CO.
4615 ARTHINGTON STREET, CHICAGO, ILLINOIS

SUN
FUEL MISER
AUTOMATIC OIL FURNACES

Make You Money and Friends



THE MOST COMPACT QUALITY OIL FURNACE IN AMERICA

LOOK at these features!—

- Over 85% Efficiency
- Absolutely No Fire Pulsation
- No Expansion Noises
- Operates on .02" Draft
- Counter-Flow Air Travel
- Steam Jet Humidifiers (No Liming)
- Beautiful Baked Finishes

... 3 TYPES ...

Basement—Utility—Space Heater

7 Sizes—80,000 to 400,000 B.t.u.

PRICED FOR YOUR PROSPERITY

Cash in today! Write—

J. V. PATTEN COMPANY, Inc.

200 DeKalb Ave.

Sycamore, Illinois

Simplified Engineering Method

(*Continued from page* 44)

For attic systems carry the full size of the furnace bonnet into the attic space to make a plenum chamber from which the main ducts can run.

Good covering on ducts is of course a fuel saver. California uses generally ¼" air cell. Colder climates should have a better duct covering than this.

Thermostats will do better if located near the return air grille than elsewhere. If located in the living room, for example, they usually shut the job down too soon.

Humidity pans in the furnace bonnet with an automatic float level of the ball type give good service.

Filters will clog up in the course of time and in a surprisingly short time in some cases. A clogged filter results in a reduction of air flow. With a limit control on a gas fired job, for example, a clogged filter will simply result in a quick shut down of the furnace and a complaint from the owner of no heat. Owners should be instructed to inspect and clean filters at stated intervals.

Partial summer cooling can be obtained from these systems by providing a by-pass in the return duct system so that the air can be taken from the foundation space or from the basement. No recirculation should be used. As the basement air is usually quite a bit cooler than the air at higher levels, the cooling effect is rather surprising.

The next development in this type of system will provide modulating control of the fuel and two or three speed control of the fan. This will be a benefit to the industry and the best results in heating will be obtained from constant fan operation.

In conclusion, we believe that if you will try this system of design out for a few times you will find that you can design and estimate a very satisfactory plant for a 6 room house in less than an hour.

◆

Walsh Moves

Walsh Refractories Corporation, St. Louis, has moved their general offices to new and larger quarters at 4070 North First Street—just four short blocks from the former location.

Previously occupying considerable factory space for general offices, this move increases the production capacity of the St. Louis plant for "Cast-Flux," the Vacuum Cast Flux block, other glass house refractories, high temperature cements, plastics, castables, wall coatings, special shapes, etc., on which the St. Louis factory specializes.

Additional new equipment has also been installed for increased production at the Vandalia, Mo., factory, where Hi-Lumite, Mullitex, Warco XX and Warco fire bricks are produced.

CASH IN on profitable FURNACE REPAIRS *. . . NOW!*

The time to start scouting up those profitable furnace repair jobs is RIGHT NOW before somebody else steps in and takes them. Furnace repairing is a highly lucrative business and the smart furnace man who gets an early start, gets the jobs, and then makes all the necessary repairs with parts from NORTHWESTERN, is the one who will make the extra profits.

That's the *right* way to increase your business this Fall. Make repair jobs last a lifetime with perfect fitting grates, firepots, pipe, humidifiers, etc. from NORTHWESTERN'S unlimited supply. All our parts are guaranteed! Made to *fit* and fit right.

We suggest that you lose no time in writing for our catalog showing the complete line of up-to-date repair parts for all makes of furnaces. Drop us a postcard TODAY!

Write Today for Catalog

NORTHWESTERN STOVE REPAIR CO.
Manufacturers of Stove, Furnace and Boiler Repairs
662 WEST ROOSEVELT RD., CHICAGO, ILL.

Get GRAY QUALITY *in Gutter Fittings, too*

The makers of Gray "Snap-Rite" Pipe and Fittings also produce Gray Gutter Fittings—the finest equipment you can buy. Workmanship and materials are the highest, but the price is remarkably low.

The Gray Gutter Hanger, a one-piece combination, is used in place of the No. 10 shank and circle. Quickly erected, it is both strong and ornamental.

Gray Gutter Fittings are easy to work with because they are designed and built by men who understand your problems in installation. Don't be content with anything but Gray quality and workmanship. They cost no more.

An outstanding feature of the Gray Gutter Hanger is the reinforcement finger which extends up behind the bead as shown in this illustration, preventing sagging when a ladder is placed against the gutter.

Write today for descriptive matter and prices on Gray Gutter Fittings. Once you work with them you'll agree they are the finest money can buy.

GRAY METAL PRODUCTS CO.
ROCHESTER • NEW YORK

Snap-Rite

Hayfever Relief Through Air Conditioning

(*Continued from page* 51)

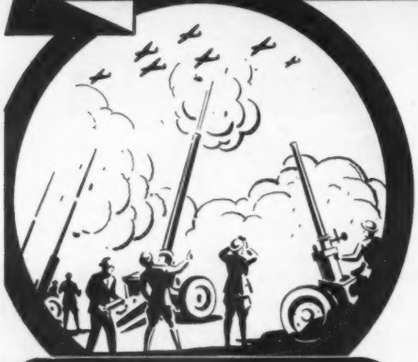
on the part of everyone. Hayfever is generally caused by pollen from trees, grasses, or weeds as found in ever-increasing quantities in all parts of the United States, but in some cases other allergic agents may be responsible. Modern sedentary occupations and urban concentration of population have undoubtedly contributed to the increase in the number of hayfever sufferers. Hayfever may be caused by irritation of the mucous membranes or by the absorption of the pollen proteins by the blood. Some persons build up an immunity (partial or whole) against "protein-type" hayfever by out-of-season pollen-serum injections.

Hayfever symptoms can be relieved most logically by removing the cause; controlled vegetation and an application of the principles of land conservation would help considerably in reducing the amount of pollen produced by trees, grasses, and weeds. Air filtration that removes all but traces of pollen will relieve symptoms of hayfever. In addition to pollen concentrations, weather changes are important influences in precipitating attacks of hayfever in cedar-pollen sensitive patients. Hayfever can be relieved by air conditioning methods which can be varied to meet seasonal requirements.

The tests conducted by the Bureau of Engineering Research at The University of Texas show that cedar-pollen causes hayfever and that it may be relieved by mechanical means. These tests made possible the recommendation of an acceptable type of air filter for the purpose, also the design of a fan-filter-heater unit for the relief of cedar-pollen (winter) hayfever. The mechanical air filter recommended for use in this unit is a dry cellulose mat type of inexpensive and renewable construction in addition to being about 85 per cent efficient. These features combined with the simple construction of the complete unit make possible low manufacturing and low operating costs. The University of Texas air-conditioning unit provides a possible means of relief to thousands of Texas citizens who are now suffering with cedar-pollen hayfever and its distressing symptoms. By replacing the heater with cooling coils, the unit could undoubtedly be adapted for the relief of hayfever caused by summer pollens.

This concludes our publication of the bulletin. This bulletin "Engineering Research Bulletin No. 31" is available in limited quantities free of charge. Write the University of Texas, Austin.

FIRST LINE OF DEFENSE
For Air Conditioning Performance



AIR-MAZE *Kleenflo* **Filter Panels**

The use of efficient and dependable air filters is your *first line of defense* against damaging dirt, dust, pollens and other impurities. It is also your protection against lowered efficiency of your unit caused by restricted flow of clean, pure air.

AIR-MAZE *Kleenflo* filter panels embody a scientific baffle-impingement principle that filters all dust, pollens and germs out of the air. They are economical, *first*, because they eliminate unnecessary "drag" on motor and blower, and, *second*, because they need no replacement. It takes only a few minutes to clean AIR-MAZE *Kleenflo* panels for additional long periods of top-notch performance.

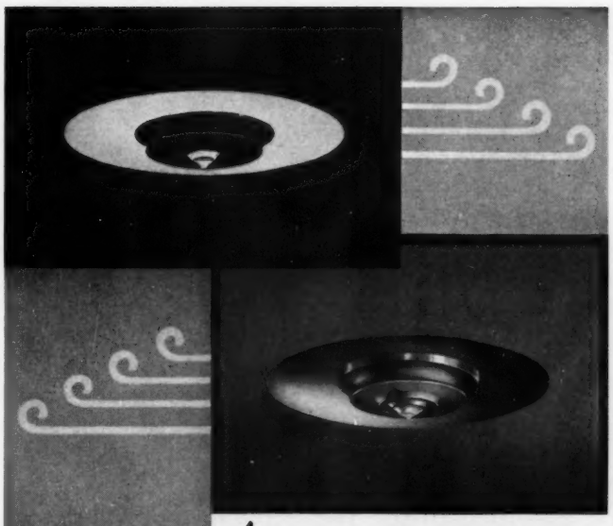
APPROVED BY THE UNDERWRITERS' LABORATORIES

Of scientific all-metal construction AIR-MAZE *Kleenflo* filter panels are *approved by the Underwriters' Laboratories as fire retardant.* They are odorless, sturdy and easy to handle as they slip readily into existing panel spaces.

WRITE FOR COPY OF LATEST CATALOG.

AIR-MAZE CORPORATION
5130 HARVARD AVE. CLEVELAND, OHIO

AIR-MAZE



Recessed **venturi-flo**

Draftless Air Distribution

Showing how beautifully the VENTURI-FLO-LITE Ceiling Outlet adapts itself to this type of lighting treatment, providing an ample source of illumination combined with exceptionally effective air distribution. The air passages in the VENTURI-FLO-LITE unit are scientifically designed for uniformly diffused flow, large aspiration capacity, and low noise level. Please write for further details.

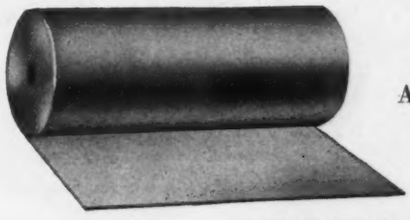
BARBER-COLMAN COMPANY
ROCKFORD • ILLINOIS

SAL-MO

NOW is the time to get Warm Air Heating Equipment in shape for the winter season.

See your nearest Jobber; he can furnish you with the proper type of SAL-MO insulation; Plain and Corrugated Asbestos Papers, Furnace Cement, Pipe Coverings, etc.

SALL MOUNTAIN COMPANY
176 West Adams St. Chicago, Illinois



SAL-MO ASBESTOS PAPER

ASBESTOS

Get a Big Slice of

GRAVITY FURNACE BUSINESS

with

Home Comfort

Steel Gravity Furnace

500-G SERIES

4 Sizes (20" to 26")

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HIGH RATED CAPACITY BY UNIVERSITY OF ILLINOIS
Priced Right

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Write for Details and Sales Rights

ST. LOUIS Furnace Mfg. Co.
2901-11 ELLIOTT AVE.
ST. LOUIS, MISSOURI

TRIANGLE *Shock Absorbing* **PILLOW BLOCK**

(Patent Pending)

New Type Silent Bearing for Blower Service

Unique engineering encloses bushing, cushion and oil reservoir in pressed steel ball, making compact unit streamlined to present minimum of air restriction. Built-in, oil-proof, synthetic rubber cushion absorbs vibration. Porous bronze bushing, wick-fed from large oil chamber insures lubrication for exceptionally long periods of operation. Positively self-aligning due to ball and socket action of spherical housing and mounting.

Results! Low cost, increased air delivery, utmost durability and freedom from vibration. Quotations submitted on request.

TRIANGLE MFG. CO., 395 Division St., Oshkosh, Wis.

THERE'S A HESS FURNACE FOR EVERY TYPE OF FUEL

The HESS line is complete, including welded steel furnaces up to one million B.t.u. capacity, blower filter units, oil and gas burners, stokers, and all accessories for complete installations.

The HESS franchise offers you one reliable source of supply with a background of 66 years of successful experience, real territory protection, and effective advertising materials.

The new HESS Gas Furnaces, gravity and forced air styles, come rated from 48,000 B.T.U. up to 200,000 B.T.U.

Write for 1940 Dealer Portfolio.

HESS WARMING AND VENTILATING CO. 1211-27 S. WESTERN AVE CHICAGO ILL
Established 1873

Dingle—Bookkeeping

(*Continued from page* 84)

are completed and are billed, the bookkeeper will transfer the costs of those jobs, as shown by her cost sheets, from this Work in Process account to the Cost of Sales—Labor, and Cost of Sales—Material. See discussion under "INCOME." Thus, at the close of each month. and also at the close of the year, this account will contain only the cost for materials, labor and supplies, of such jobs as are still in process. The care in which the labor reports and material tickets are handled in the shop will materially increase the efficiency of the office in the keeping of this account in proper condition at all times.

21—BUILDING. This account is provided for the purpose of containing the cost of the real estate and building, if it be owned by the business. See also account No. 71, Reserve for Depreciation —Building.

22—MACHINERY & EQUIPMENT. The investment in Machinery and Equipment is carried in this account, and as sales are made of old or obsolete machinery or equipment, it should be credited to this account at its cost, if that be ascertainable. As new items are added to equipment, this cost will be charged here. This account, then, will at all times show the cost of the equipment owned. See Reserve for Depreciation for comments on the manner of providing for the wear and tear on the machinery and equipment through use. A well equipped shop is a "good investment."

23—DELIVERY EQUIPMENT. Except for the fact that this account will contain the cost of a different kind of property—that called delivery equipment—this account is identical with Machinery & Equipment, discussed immediately above. Do you realize that you are frequently judged by appearances? How does your delivery equipment look? A little paint might be a good investment.

24—FURNITURE & FIXTURES. This account, like Delivery Equipment, is similar in use and purpose to Machinery & Equipment, and the remarks there made are applicable here. An office should be properly equipped to produce good results. You should have a proper place to receive customers, and a suitable place for your bookkeeper to perform her duties.

31—PROPRIETOR'S DRAWING ACCOUNT. This account is raised to contain, as the name implies, the withdrawals from the business by the proprietor from time to time. He should not show his weekly or occasional withdrawals of money for living expenses as "salary" or wages, for the reason that he must account for all profits, before any salary to himself, in the preparation of his income tax return for the Federal

COMPARE MAUREY V-PULLEYS

STEEL

With Any V-Pulleys Made

VARIABLE PITCH

CAST IRON

. . . and you will readily see why so many builders of high grade Air Conditioning and Refrigeration Units, Blowers, Fans and Stokers find that MAUREY V-PULLEYS save time and money.

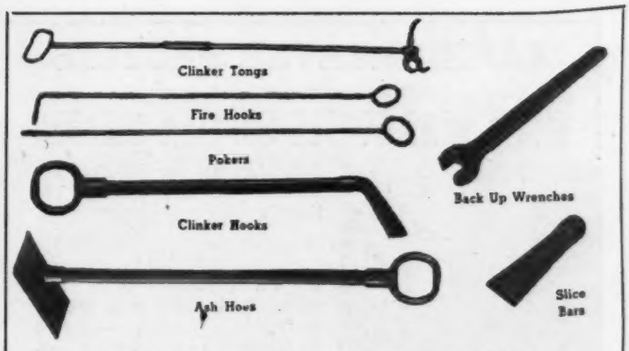
MAUREY STEEL V-PULLEYS are designed and built to give maximum service. Made of heavy steel with machined steel or malleable hubs —not die cast.

MAUREY VARIABLE PITCH PULLEYS of cast iron construction. Speed adjustment of as much as 30%. Fine, accurate, milled threads, 20 to the inch assure close adjustments. In 5 sizes—3¼" to 5½" O. D. For Air Conditioning Units.

MAUREY CAST IRON V-PULLEYS are made on a new principle of design that permits freer flow of air through spokes. Balanced and true-running, they are much sturdier than pulleys of the usual design. Grooves machined to micrometer accuracy.

Send for Circulars and Prices.

MAUREY MANUFACTURING CORP.
Wabash at 29th, Chicago, Illinois



NOW IS THE TIME TO STOCK

- FARRELL-CHEEK -

QUALITY FURNACE TOOLS

A COMPLETE LINE FOR EVERY NEED

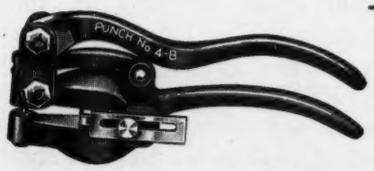
Sturdily constructed, Farrell-Cheek Tools are built to give years of severe usage, and designed to meet practical service requirements. They are efficient, easy to handle and very rigid to withstand abuse. All tools are constructed of durable cast steel with welded pipe couplings.

WRITE TODAY FOR CATALOG AND PRICES

FARRELL-CHEEK STEEL CO. SANDUSKY, OHIO

WHITNEY

LEVER PUNCHES



NUMBER FOUR "B" PUNCH

This punch for sheet metal work has a capacity of ¼" through 16 gauge. Weight 3 lb. Length 8½". Depth of throat 2". Complete tool includes three punches and three dies of specified sizes with die adjusting key. A time-saver for your up-to-date shop.

And here's another handy tool for the modern shop — the No. 2 Punch. Length 23". Capacity 5/16" through ¼" iron, weight 12 lbs., depth of throat 1 11/16". Punches and dies 3/32" to ½" by 1/64".

NUMBER TWO PUNCH

W. A. WHITNEY MFG. CO.
636 RACE ST. ROCKFORD, ILL.

Sell It · · · · Install It

With

CONFIDENCE

Simplicity of operation and ruggedness of construction insure the long life and trouble-free use of this regulator. No dissatisfied customers — no failures to result in service calls.

MASTER

HEAT REGULATOR TYPE A-23

This positive, snap action regulator operates on a differential of only ½ degree. Accurate, dependable, low cost, it will outlast the heating plant itself. Operates quietly, surely, and safely—to the complete satisfaction of the most exacting user. Write us today for Bulletin giving complete information on the Master line.

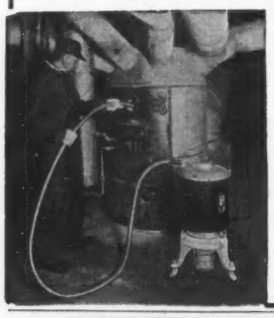
Makers of Dependable Regulators for Over 20 Years

WHITE MFG. CO.
2368 University Ave. ST. PAUL, MINN.

EARN GREATER PROFITS

from furnace cleaning work

with a KENT DOUBLE SUCTION CLEANER



NOW, before the fall fires are built is your Busy Season. The Kent is

fast sturdy portable

Use a KENT to get into the basement. Find out if new heating equipment is needed. Get paid for a furnace cleaning job anyway.

Write today for details.

THE KENT COMPANY, Inc.

167 Canal St. Rome, N. Y.

IRONSET

FURNACE CEMENT

CAN BE FIRED IMMEDIATELY

Actual Tests Prove

that Ironset withstands higher furnace temperatures without failure where other cements crack, shrink, bloat, and blister.

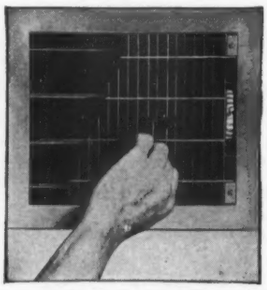
Don't risk a good job with haphazard cement work. Seal every furnace absolutely gas-tight with Ironset Furnace Cement. End complaints and create customer good will.

Ironset is stocked by leading jobbers everywhere in 1, 5, and 10 lb. cans, also in 50 and 100 lb. drums. Order from your jobber today or write us for prices and free bulletin.

FIRELINE STOVE & FURNACE LINING CO.

1816 KINGSBURY ST., CHICAGO, ILL.

REGISTERS & GRILLES



The "Air-Con" Finger Tip Air Control Double Diffusing Registers

Can direct the air flow up or down and to the right or left. This is in addition to our extensive line of registers, perforated sheets, and ornamental grilles.

Write for our catalog.

STANDARD STAMPING & PERFORATING CO.

3137 W. 49th Pl., Chicago, Ill.

PORTABLE SHEARS

ALL-ALLOY

ALL-ALLOY No. 2 cuts up to ¼" steel plate.

ALL-ALLOY No. 1 cuts up to No. 11 gauge strip or sheet.

Special blades may be had for shearing stainless steel.

FULLY GUARANTEED

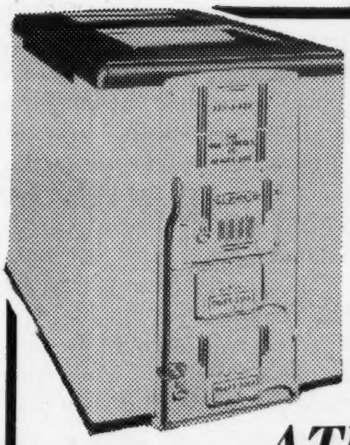
BREMIL MFG. CO. Erie, Pa.

government. Of course, if the shop owner be engaged in actually working with his men in the fabrication of the work and its installation, the Sales of Labor will include any return for such labor. In such cases where this is a question, we would prefer to have the shop owner or his bookkeeper write us for specific directions for the proper handling of this matter. This account, then is provided for the purpose of containing any personal withdrawals by the proprietor or his family (other than members of his family actually employed at a salary or wage) whether in cash, or in merchandise from the shop, or in payments made, either in money or merchandise, to other merchants for account of the proprietor.

If the business be a partnership, separate accounts should be used for each partner's personal withdrawals. If the business be conducted by a corporation, the officers and employees would be paid salaries, and, as is sometimes the case, the salaries are credited to the individual drawing accounts and amounts drawn are charged against the account, thus showing the condition of the officer's or employee's account with the company at all times. Many men forget that they must not overdraw their account. If someone else allows you to overdraw, they must furnish the capital. If you spend money your business needs, that's your hard luck. Watch your personal withdrawals and try to leave some of the profit in the business. It can not grow unless you do this.

41—DEPOSITS — FRANCHISE. In these times, a business man may be called upon to make a deposit to secure a franchise for the sale of certain materials, or appliances. Again, it is sometimes necessary to make a deposit with the architect upon taking out a set of plans for the purpose of figuring the job. This deposit account is provided for the purpose of containing any such deposits, and when refunded, the account should be credited. Thus, the account will at all times indicate the amount of any or all deposits outstanding at any given time.

42—PREPAID INSURANCE. As this account name implies, it is to contain any "prepaid insurance" value which may be present in the business. Too often, a small business man will pay his insurance and consider it expense at the time of payment, notwithstanding the fact that it may run for one, two or three years. While this method has its value, we feel that the inclusion of a whole year's insurance in a single month's expense overstates that month's expense, and distorts the month's operating profit, which is not to be desired, and again, this method frequently aids in letting a business man run out of insurance without knowing it, and it so often happens that the fire comes the day after the policy expired. By setting up as an asset, a thing owned, the total



★ Modern

★ Efficient

★ Durable

★ Economical

ATH-A-NOR

AIR CONDITIONING UNIT

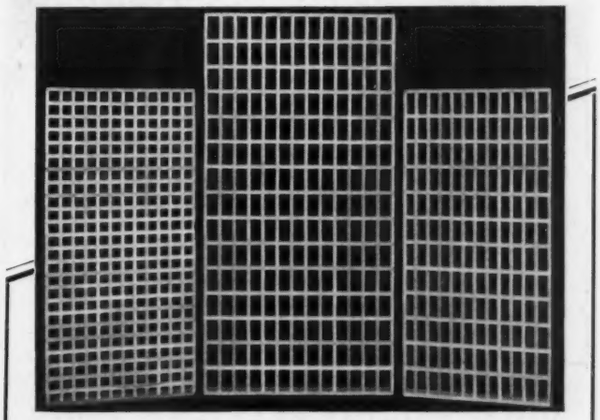
The ATH-A-NOR Deluxe is designed to meet the ever increasing demand for a modern, efficient, durable and economical air conditioning unit. The new full height Front is pleasing in appearance as well as modern in design to enable you to sell the Home-owners who have new or recently modernized basements.

The ATH-A-NOR line of furnaces has a model to meet every price and every purpose. Available for coal, oil or gas firing, the versatility of these units make them standouts in the field.

We suggest you drop us a line today for further information.

THE MAY-FIEBEGER COMPANY
NEWARK OHIO

MARSH WOOD FACES



Modern, tasteful appearance of grille work and registers is of prime importance in these days of ultra modern buildings. Marsh Wood Faces are just the thing for cold air ducts and air conditioning systems where harmony between grille and woodwork is desired.

These superior wood faces are built of the finest selected kiln dried oak, accurately machined on specially designed machinery for the specific purpose of making wood faces.

A handsome, efficient installation of Marsh Wood Faces will work to your advantage in securing many repeat orders on customer recommendation.

Write today for catalog.

MARSH LUMBER CO., INC.
DOVER OHIO

MEMO

FROM: Sales Manager

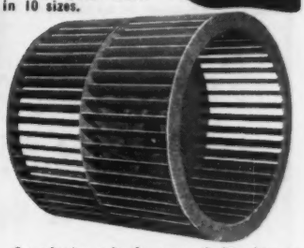
TO: Adv. Manager

Please make a note of the important message about January 1941 in the October issue of AMERICAN ARTISAN.

P. S. You'll find it on page 14.

We Use CLARAGE FANS because Every Wheel is BOTH Statically and Dynamically Balanced

At left — complete fan for forced air heating or year-'round conditioning. Very compact. Built in 10 sizes.



Or wheels only in any of 10 sizes to give any desired volume and pressure.

TRY these QUIET-RUNNING UNITS

Standardize on Clarage — and protect your jobs against "fan troubles." Perfectly balanced wheels, improved bearings and slow operating speeds insure QUIETNESS — guarantee long service. Most widely used equipment in your field. Write for Bulletin 33 and see why!

COMPLETE AIR CONDITIONING • COOLING • VENTILATION • FACTORY HEATING • MECHANICAL DRAFT • FANS and BLOWERS for INDUSTRIAL NEEDS

CLARAGE FAN COMPANY—KALAMAZOO, MICH.
FIELD ENGINEERING OFFICES IN ALL MUNICIPAL CITIES

BETTER WORK — Faster with Osborn Roofing Clips

Special cone rivets are uniformly straight and tight fitting. Head rests on beam.

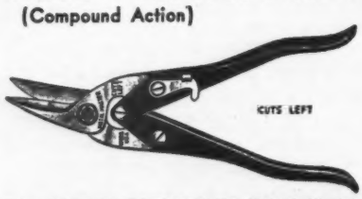
Oval shaped top fits up tight into corrugation.

Flat under surface. Hook adjusts itself to any standard channel or I-beam.

Cadmium coated after forming. Made in two sizes—rivet projects ¼" or ⅜" above clip. Ask your sheet metal distributor to show you an Osborn roofing clip or write us for a sample.

THE J. M. & L. A. OSBORN COMPANY
1541 East 38th Street Cleveland, Ohio

WISS "METAL-MASTER" SNIPS
(Compound Action)



"TWICE THE WORK WITH HALF THE EFFORT"

TWO MATCHED PATTERNS M1 (Cuts Left) M2 (Cuts Right) Cut circles, squares and any irregular patterns on Stainless, Dural and Monel Metals with the greatest of ease. Jaws of wear-resisting Manganese Molybdenum Steel. Handles hot-pressed from tough Chrome Vanadium Steel. Nickel steel bolts and nuts to Government specifications. All parts interchangeable. Detachable rubber handle grips at slight extra cost.

J. WISS & SONS CO.
ESTABLISHED 1848 NEWARK, N. J.

PEERLESS Has The Units That Make Profits For Dealers . . .

Don't lose sales because you haven't the right size and price of unit to sell. Peerless dealers have everything from lowest priced cast iron and steel furnaces to completely automatic conditioners, in all sizes and priced right for quick sales. Liberal discount to dealers. Get literature and proposition NOW, and prepare for your biggest and most successful year.

PEERLESS FOUNDRY COMPANY
1853 LUDLOW AVENUE INDIANAPOLIS, IND.

For the Biggest Value in BLOWER-FILTER UNITS
SCROLLS OR HOUSINGS

An efficient, compact manufacturing unit is producing outstanding value in Blower-Filter Units, Scrolls, Housings. More for your money — plus prompt delivery.

UNITED STATES AIR CONDITIONING CORP.
NORTHWESTERN TERMINAL • MINNEAPOLIS, MINN.

premium paid for the insurance, and then each month charging insurance, the expense account, and crediting this asset account, with the month's cost of insurance, the bookkeeper and the business man are both on notice that the insurance is being consumed and when the account approaches the vanishing point, it is time to be on the watch for the renewal policy. While on this subject, there occasionally arises instances where other expenses are paid in advance. In such instances where the amount is of substantial sum, it would be good policy to open a proper prepaid account to contain such prepayment and as the prepaid amount is consumed, proper entry transferring such prepaid expense to expense should be made at the close of each month.

•

Bonding Paint To Copper

IT IS difficult to obtain a good bond between paint and copper. This is due to the grease and oil of the manufacturing process which is rolled into the fine pores in the surface of the sheets.

Paint applied directly to untreated copper will not stand for any length of time, particularly when exposed to the weather. The surface must be thoroughly cleaned and roughened before the paint will adhere.

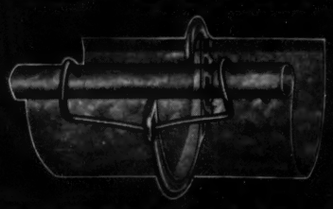
This may be accomplished by washing the copper with a solution of 4 ounces of copper sulphate in one-half gallon of lukewarm water in a glass or earthen vessel, to which is added one-eighth ounce of nitric acid. If the surface is still very smooth, additional roughening must be done by abrasives.

Before painting, the surface must be carefully washed with clean water to remove the last trace of the solution and the paint must not be applied until the surface is thoroughly dry.

Three coats of paint will give the best results. The first coat should be composed of 15 pounds of red lead to one gallon of raw linseed oil with not more than one-half pint of oil dryer. The last two coats should be composed of 15 pounds of white lead to one gallon of raw linseed oil with not more than 5 per cent of oil dryer and the necessary color.

"BB" QUALITY

Order from your jobber



Saves time and labor

"BB" SPRING CIRCLE CLIP
Furnished only with "BB" Circles at no extra charge over old style straps.
BERGER BROTHERS CO.
229-237 Arch Street, Philadelphia, Pa.

Old Spires Recovered with Copper

(*Continued from page 75*)

Church authorities wanted a patina quickly. This meant artificial treatment and the solutions had to be applied before scaffolding was removed. To obtain the color, muriatic acid cut with zinc was sponged onto the copper and color was obtained in 24 hours. Color was obtained more readily on damp nights than on dry days or nights, but a heavy rain one night brought streaks on newly treated areas, but not on areas colored two or three days previously.

◆

Two Speed Fan Effect With a "Spring" Motor

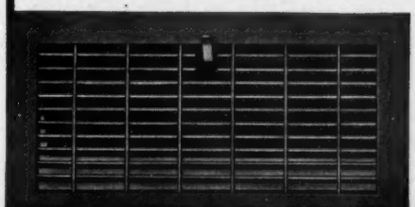
(*Continued from page 49*)

on the control operating lever.

This installation changed a discontented customer to a satisfied booster as has been verified by studying the test results. The writer feels that the application of this basic control to modern direct fired forced air conditioners is a step forward in the installation of better systems.

INDEPENDENT "Fabrikated"

No. 311-A *adjustable* DIRECTED AIR FLOW REGISTERS *and* GRILLES



After the register or grille is in place, and without taking it out, adjustments can be made until exactly the right deflection of air flow is attained. Send for catalog today.

THE INDEPENDENT REGISTER CO.
3747 EAST 93RD STREET • CLEVELAND, OHIO

1040

10 FOOT HIGH ALUMINUM LETTERS
Made with
LIBERT *Hi-Speed* SHEAR
by
EVERBRITE ELECTRIC SIGNS, INC.
Milwaukee, Wis.

Miller's Modernized Store Front, planned and built by Everbrite Electric Signs, Inc., Milwaukee, received National recognition for its attractive, modern design. The letters, one group 10 feet high, and another 3 feet high, were cut from heavy 16-gauge Aluminum on a LIBERT Hi-Speed Shear.

Here is a fine example of the intricate work, the fast, smooth shearing—and the unusual versatility of LIBERT Hi-Speed SHEARS. LIBERT Hi-Speed SHEARS save time, labor and money. Offer fast shearing, in a great variety of shapes, without adjustment. Made for all metals up to 10-gauge thickness.

Ask your Libert Distributor for a Demonstration or write for latest bulletins.

LIBERT MACHINE COMPANY
Green Bay, Wisconsin
Manufacturers of Shears since 1915

Libert Hi-Speed SHEAR

"Five Good Reasons Why Jobber Concentrates On Williamson"

"The Williamson Heater Company:

In 1935 we decided to concentrate on the Williamson line exclusively because of: (1) The well-known quality and advanced features of Williamson products. (2) The completeness of the line. (3) The completeness and easy assembly of Williamson equipment, pre-fabricated pipe, duct, fittings and accessories. (4) The satisfactory margins provided both jobber and dealer. (5) The growing preference of our trade for Williamson products.

We cannot speak too highly of the fair and square treatment you have accorded us during the years we have been doing business with you."

Signed— X Y Z, ... Pennsylvania.

Complete information; name, address of writer of above letter furnished on request. Phone, wire or write The Williamson Heater Company.

FREE: Complete, easily understood short method for figuring air conditioning job. You can complete your figures, price job in one hour flat. Write Dept. No. 2. The Williamson Heater Company, Cincinnati, Ohio.

Complete Line . . . Quick Service

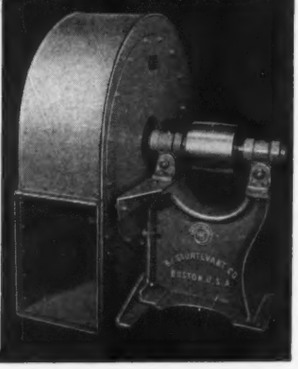
WILLIAMSON
WARM AIR FURNACES
1890 — Golden Anniversary — 1940

MILL EXHAUSTERS

1. Designed and built by the **Pioneer** exhauster manufacturer.
2. Result of over 75 years of air engineering experience.
3. High efficiency assures low power consumption.
4. Sturdy construction assures dependable service.

Write for Catalog No. 430

B. F. STURTEVANT CO.
Hyde Park, Boston, Mass.
Branches in Principal Cities



Any range 15 F.P.M. to 24,000 F.P.M.

TAKES **JUST A MOMENT** TO CHECK AIR VELOCITIES WITH THE

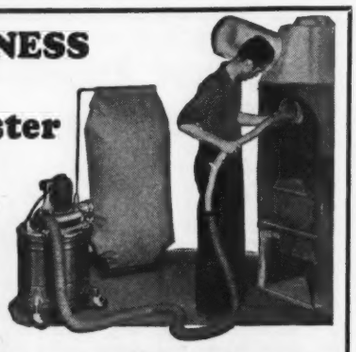
Alnor ALL PURPOSE VELOMETER

You can save time and know whether your heating and air conditioning jobs are right when you use the "ALNOR" Velometer. Without timing or complicated mathematical calculations the Velometer gives direct, accurate, instantaneous air velocity readings. Many users report that with the Velometer they can check and balance a system in one tenth the time formerly required, and the Velometer gives them a picture of air distribution that no other instrument can. Write for details.

ILLINOIS TESTING LABORATORIES, INC.
419 N. La Salle Street Chicago, Illinois

FALL BUSINESS Can Be Handled Faster with the GRAND RAPIDS FURNACE CLEANER

Free Trial
Convenient Terms



Write for Details

DOYLE VACUUM CLEANER CO.
227 STEVENS ST., S. W. GRAND RAPIDS, MICH.

PARKER-KALON Jiffy REGULATOR SET

SIMPLE . . . LOW COST
SAVES TIME
AND LABOR

For controlling dampers in heating, ventilating, air conditioning systems.

PARKER-KALON CORP., 200 VARICK ST. NEW YORK, N. Y.

INSTALLED IN A JIFFY!

Slip on FRAME and LEVER

Turn WING NUT

SOLD ONLY THROUGH RECOGNIZED DISTRIBUTORS

160,000 Pound Duct Installation

(Continued from page 73)

There are innumerable elbows, turns, takeoffs, fittings—all of which had to be properly sized, located and connected into the runs of pipe. Engelhaupt, therefore, used field measurements in laying out the runs and obtained necessary adjustment in the straight sections. To facilitate erection, all duct work was divided into sections and each section was stenciled in the shop for identification on the job. Ducts, so far as possible, were erected in complete runs of pipe in order that shop fabrication would not become congested and pieces not immediately needed delivered to the job too far in advance of use.

General Design of System

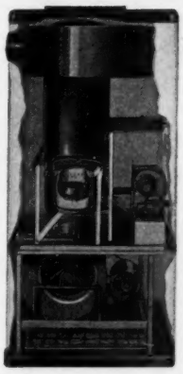
Heat through the building is supplied by direct radiation. The duct system described is for air conditioning and ventilation only. In the summer the building is cooled by refrigerated water which is passed through the cooling coils and introduced into the rooms by the supply fans. Some of the air is recirculated but, as the plans show, outside air and recirculated air can be proportioned at the intake louvres to the supply fans. Refrigeration compressors are located in the basement.

For winter operation outside air, recirculated air or proportions of each are set according to the weather and the audience size. In the supply fan housings there are preheat coils, filters, reheat coils and humidifiers so that the ventilating air can be maintained at approximately 70 degrees. The systems are designed to permit one hundred per cent recirculation, but this is intended only for short heating up periods. The outside air intakes are sized to utilize 100 per cent outside air when atmospheric conditions are favorable.

Since acoustics were of paramount importance, complete control was maintained over all air flow. Resistance is minimized by the use of resistance designed ducts; use of turning vanes in all sharp elbows; use of Anemostats in many lower level rooms; use of 45 degree and 22½ degree faces in the auditoriums.

The space underneath the auditorium is a return air plenum which air enters through some 700 mushrooms in the floor. The fans connect with this plenum by tunnels built of tile but lined with ½-inch acoustical felt to deaden sound. All supply duct work for the first 30 feet out from the fan is similarly lined, the lining held in place by sheet metal screws and large washers.

VIKING OIL-BURNING FURNACES



Models for every type of installation.

Specially Designed for TODAY'S BIG MARKET

TO FIT THE *Smaller Capacity* FIELD

Viking saw it coming three years ago—the swing to modern air-conditioned heating for smaller, low-priced homes. And Viking set the pace by designing a *completely new* line of furnaces rated from 55,000 to 100,000 B.T.U. New and different, modern, compact units—amazingly efficient and priced to sell! They're time-proved sales leaders—real profit-makers for you! Write for catalog.

OIL BURNING WATER HEATERS

Think of it! A completely automatic quality-built water heater that retails as low as $75 installed—and really performs! Proved dependable by thousands of installations. Equipped with famous Breese burner, shelf or door mounted—and a host of features that get big sales volume. Write today for complete line catalog.

VIKING MFG. CORPORATION, 12602 Greenfield Ave., Detroit, Mich.

Your *Randall* DEFENSE against bearing troubles

Give your equipment the "all clear" signal now.

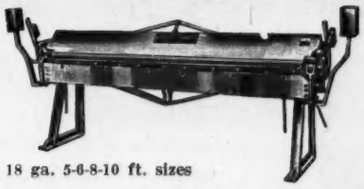
Let Randall Pillow Blocks guard your equipment against bearing failure. Throughout their long life, Randalls give remarkably quiet and trouble-free service with only minimum maintenance. The success of Randalls on the majority of air conditioning equipment proves the efficiency and economy of these self-lubricating and constant self-aligning pillow blocks.

There's a low-in-cost Randall to meet every pillow block need. Write for catalog today.

One-Piece Steel Housing Pillow Block

RANDALL GRAPHITE PRODUCTS CORP.
Dept. 1011, 609 W. Lake St. Chicago, Ill.

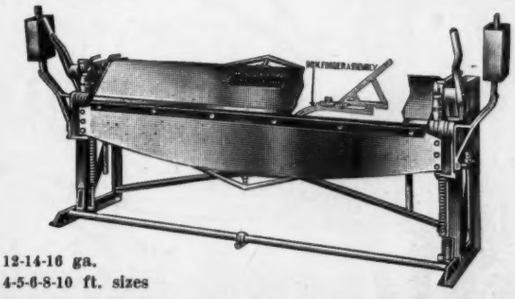
BENDING BRAKES **WHITNEY-JENSEN** METAL TOOLS



18 ga. 5-6-8-10 ft. sizes

ALL WHITNEY-JENSEN BENDING BRAKES NOW FURNISHED WITH HARDENED JAWS

• Another great improvement in modern bending brakes! On all Whitney-Jensen Brakes the jaws—including the upper rail, lower jaw, apron, and filler plate—*are now hardened.* This means greater durability, lasting accuracy, better work.



12-14-16 ga.
4-5-6-8-10 ft. sizes

WHITNEY METAL TOOL CO. • 91 Forbes Street, Rockford, Illinois

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NEW AIR CONDITIONING REGISTERS

The New Rock Island line of Air Conditioning Registers now shown in complete new catalogue just off the press.

No. 822 Wall Register···Horizontal Vanes

The New Rock Island Air-Vane Registers are of bar type fabricated construction—Attractive Appearance—Rigid Construction—Vertical or Horizontal Vanes—Simple, secure adjustment.

New Catalogue and Dealers Net Estimating Book, a time and money saver, gives full particulars, prices, etc.

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Finest Materials
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Congress Drives, manufactured in America's most modern die casting plant, are your assurance of complete satisfaction. Write today for Catalog. Samples for test purposes available to rated concerns.

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Congress Tool & Die Co.
3758 E. Outer Drive Detroit, Mich.

SELL MORE FURNACES
with this NEW LOW PRICE
Breuer's Ball Bearing
TORNADO
Furnace and Boiler Vacuum Cleaner

Not only does it excel in furnace and boiler cleaning, but it puts you directly in touch with the furnace and repair needs of your customer. Not a converted household cleaner, but DESIGNED FOR THE JOB. Complete set of necessary attachments.

Ask for FREE SALES PLAN and Demonstration

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(Patent Pending)

CUTS BALANCING TIME IN HALF

With the MAYN AIR DAMPER Forced Air Systems can now be accurately balanced *in half the usual time.* One man *alone* can easily do the job because this new type damper is installed in the Stackhead. Easily accessible, tamper-proof, positive locking, inexpensive. Write today for Bulletin M.

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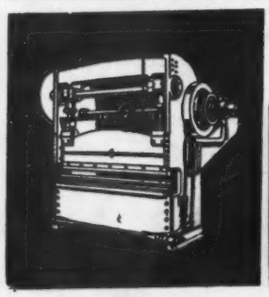
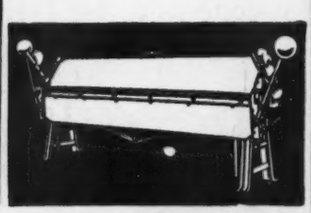
607 West Avenue ELYRIA, OHIO



CHICAGO



PRESS BRAKE HAND BENDING BRAKE
Steel Brakes—Presses—Shears
DREIS & KRUMP MFG. CO.
7404 LOOMIS BLVD. CHICAGO

Stoker-Fired Furnace Cuts Fuel Cost

(*Continued from page* 55)

and fabrication of the sheet metal work also is evidenced by the formation of the recirculation stacks. Instead of fabrication and installation of four-sided conductors, flat galvanized steel sheets, 24-gauge, were nailed to studding, covering two complete stud spaces. Three such recirculation stacks were run vertically down both sides of the building about 25-ft. apart. Stack openings of both first and second floors are 2 ft. above the floor.

Whereas cubic contents of the first floor are 45,000 ft., contents of the upper story are over 50,000 ft. to make total contents about 100,000 cu. ft. Since the fan delivery is approximately 4,500 c.f.m., the building receives about three changes of air hourly.

Altogether the Seaver Broiler Farm has nine chicken houses of about the same general size and character as the building here discussed. Each unit houses some 5,000 fowl, although occupancy per square foot of floor space is greater in the case of tiny chicks. The larger birds receive more room, this graduation occurring from the day-old stage to the 3-months finished product when the poultry is ready for market. In the building here discussed the fowl are about ready for commercial sale as broilers.

The Joy of Living
ON MICHIGAN AVENUE

The charm of Chicago is reflected in the smooth flow of life on the famous boulevard, where Hotel Auditorium is situated adjacent to the Loop and facing Grant Park and Lake Michigan. . .A truly fine hotel, foremost in comfort and cuisine.

ROOMS WITH BATH FROM $2.50
WITHOUT BATH FROM $1.50

HOTEL AUDITORIUM
GEO. H. MINK, Manager

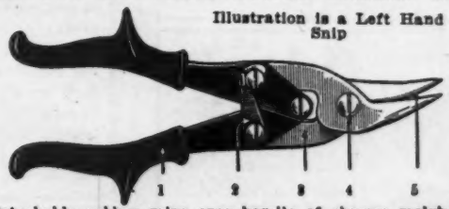
MICHIGAN AT CONGRESS
CHICAGO

System Shows Fuel Saving

Heating nine such structures, each with about 100,000 cubic foot contents, required an annual expenditure by the owner of $8,000 for oil. The proportion alloted to the building warm-air heated during the past season was $800.00. The owner purchased a carload of stoker coal, paying $7.00 a ton, delivered. He completed his heating season using 25 tons of coal, which, at $7.00 per ton is $175.00 to which must be added electric current cost for running the stoker and fan. This amounts to about $50.00, thus raising his heating-by-stoker warm air cost to about $225.000 as compared to $800 for oil. It might be explained that these are not charted figures, but are those estimated by the owner. The complete installation cost about $1,500, so that even with interest on investment and depreciation added to the warm-air-plant operation cost figure the warm air system will show a startling operating economy. And the ventilation conditions are immeasurably improved.

Editor's Note—Winter heating, winter air conditioning, summer cooling by ventilation and proper ventilation twelve months in the year is being carefully considered by progressive chicken and egg producers. We will be glad to hear about **your** *chicken house system.*

Repair Parts
FOR ALL HEATING UNITS
BRAUER REPAIR PARTS
STOVE FURNACE BOILER OIL STOVE RANGE
A. G. BRAUER SUPPLY CO.
Distributors of All Heating and Air Conditioning Equipment
2100 Washington Ave. St. Louis, Mo.

KLENK'S Double Action Aviation Snips
Illustration is a Left Hand Snip


1. Detachable rubber grips over handle of chrome molybdenum steel
2. Adjustable lock
3. Special hardened alloy steel. Tensile strength 3500 lb.
4. A. & H. Standard bolts
5. Curved jaws for cutting ends of tubing to .065 in. wall
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ACME "Hot Spot" WELDER
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Lifetime Guarantee!

ACME ELECTRIC WELDER CO.
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WITH BATH from $2.50
O. E. TRONNES, MANAGER
ONE OF THE ALBERT PICK HOTELS
HOTEL MIAMI

FOR ECONOMY-MINDED TRAVELERS!

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FRANK K. CANNON, Manager
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PONTIAC ILLINOIS

Extra!

Contains descriptions of one of America's largest stock of New, Used, and Rebuilt Machinery for Metal Fabricating and Structural Steel, Sheet Metal Machinery, Production Machinery, and Machine Tools.

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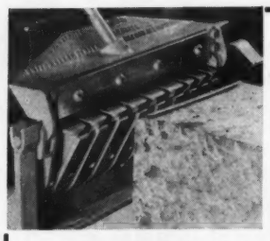

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SMITH'S CLEAT BENDER

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Makes drive cleats on job as needed!
No screwdriver needed to open drives!
No adjustments necessary, always ready!
Built for 20 Gauge and lighter.
Popular 12 inch Size shown above.
SAVES FROM $10.00 to $20.00 PER TON.

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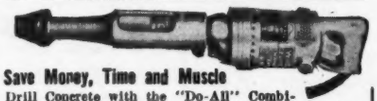

Save Money, Time and Muscle

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HUMIDIFIER ASSEMBLY
For Warm Air Furnace
List Price $2.22
INDIVIDUALLY BOXED FOR COUNTER DISPLAY
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HEATING, VENTILATING
MECHANICAL REFRIGERATION
and
AIR CONDITIONING

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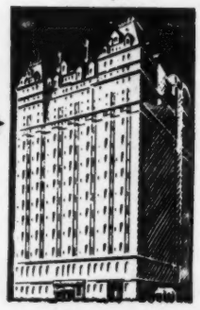
Theo. DeWitt, President — DeWITT OPERATED HOTELS — R. F. Marsh, Vice-President

The hotels that check with every travel standard



One of the Few Famous Hotels in

AMERICA

When important events come to Philadelphia, you'll find them at the Bellevue. The Republican National Committee had its headquarters here, of course. So did the Democratic National Committee four years ago. It is where things happen, and outstanding people stay. It is the meeting place of people who do things in business, art and social life.

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IN PHILADELPHIA

CLAUDE H. BENNETT, *General Manager*

Classified

AMERICAN ARTISAN Service Section

SITUATIONS OPEN

SALESMEN WANTED—The Lennox Furnace Company is building a new factory at Columbus, Ohio to service Central and Southern States. Will have openings for several experienced, aggressive, hard hitting salesmen. Write stating experience and qualifications to W. B. Shirley, Sales Manager, The Lennox Furnace Co., Columbus, Ohio.

WANTED—Salesman who knows gravity, forced air and automatic heating and who can estimate jobs and supervise installation. Excellent opportunity for right man. Address Key No. 513, American Artisan, 6 N. Michigan Ave., Chicago, Ill.

Partner Wanted. First-class sheet metal or heating engineer with some capital. To buy half interest sheet metal and heating shop. Established 1865 in southern city of 300,000 population. Address Key No. 511, American Artisan, 6 N. Michigan Ave., Chicago.

FOR SALE

Will sell on account of ill health all or controlling interest in $40,000.00 furnace and sheet metal manufacturing business located in Northwest. Established 32 years. Covers five states. Opportunity to step into going prosperous business. Address No. 509, American Artisan, 6 N. Michigan Ave., Chicago, Ill.

For sale 22 ft. draw bench with 75 dies for doors and store-fronts—good condition—sacrifice—price reasonable. Address F. E. Hoffman Corp., 491 Main St., Bridgeport, Conn.

AGENTS WANTED

Manufacturers Agents wanted. To sell new type blower. Engineers and architects like them. Many already installed. Moves more air using less power than standard type. Easier to install. Priced lower. Address, The Gallaher Co., Owatonna, Minnesota.

LINES WANTED

Warm Air Furnace Manufacturers attention. Interested in jobber or exclusive agent franchise in middle west. Complete popular priced line preferred. A-1 record with nationally known firm as salesman and branch manager. Address Key No. 514, American Artisan, 6 N. Michigan Ave., Chicago, Ill.

The American Artisan Service Section presents a golden opportunity to contact a national circulation at comparatively small cost. Manufacturers can use it to make any article sell and dealers will find it an inexpensive way to contact a live buying trade. Don't delay—send in your copy now for the next issue. See bottom of page for rates.

Use AMERICAN ARTISAN Classified Advertising for quick results. It puts you in direct touch with the buyers and sellers in the warm air heating, sheet metal contracting and air conditioning industry.

The Electric City Gutter Former

MAKE YOUR OWN GUTTER AS YOU WANT IT

Easily and quickly operated. Soon pays for itself.

REPLACEMENTS

Beading Rods, Handles, Rolls, etc., quickly furnished.

STERLING BEADER

A simple and inexpensive machine for forming round bead.

F. L. ROBERTSON

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When you buy an Electric Concrete Drill it's 5 to 1 it will be a SpeedWay Hammer

The most profitable tool you can buy — saves most labor hours by making short work of tedious jobs. Goes through concrete, stone, brick, hard cement. 1800 powerful blows per minute. Handy, correctly balanced, weighs only 26 lbs., yet takes drills up to 1¼" diameter. Built for 20 year service. More SpeedWays in use than of all other makes put together.

SPEEDWAY MFG. CO.

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STAINLESS-MONEL-COPPER, ETC.

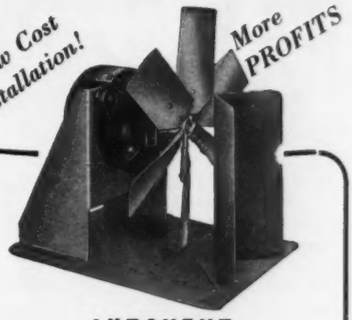
Custom fabrication of all alloys with satisfaction guaranteed. Send blueprints for prices and delivery. Years of experience guarantee responsible and accurate work. TERMS CASH WITH ORDER. Write today for further information.

RIESTER & THESMACHER COMPANY

SHEET METAL PRODUCTS

1526 W. 25th St., Cleveland, O.

Low Cost Installation! *More PROFITS*

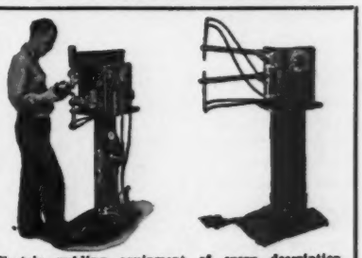


AUTOVENT FURNACE BOOSTER FAN

■ **INCREASE PROFITS . . . get more forced air heating jobs with this inexpensive propeller type furnace booster fan that every home owner can afford! It's compact—fits inside cold air duct at base of gravity warm air furnace. Solves cold room problem! Comes in 4 air capacities. Write for profit-making details!**

AUTOVENT FAN & BLOWER CO.

1807-19 N. Kostner Ave., Chicago, Ill.



Electric welding equipment of every description to weld from a watch case to a door. Special or standard SPOT WELDERS from ¼ to 500 K.V.A. A.C. Arc Welders from 100 to 400 Amps. We invite contract Spot Welding in large or small quantities.

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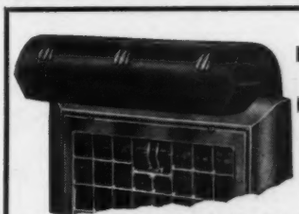
THOROUGHLY REBUILT, for perfect performance. All types; all standard makes. All sizes including the big ones. Hundreds in stock, meeting all requirements. Attractive prices. Fully guaranteed. Expert engineering counsel GENERAL BLOWER CO., Engineers, 403 North Peoria Street, Chicago, Illinois.



ECONOMY and COMFORT with SMALL OUTLAY

The FULTON LINE offers a line of Humidifiers for all types of heating equipment, attachable to registers or radiators, to retail for 50c to $1.50 each. Large sale already established. Interesting literature and prices on application.

THE PATENT NOVELTY COMPANY

FULTON, ILL.

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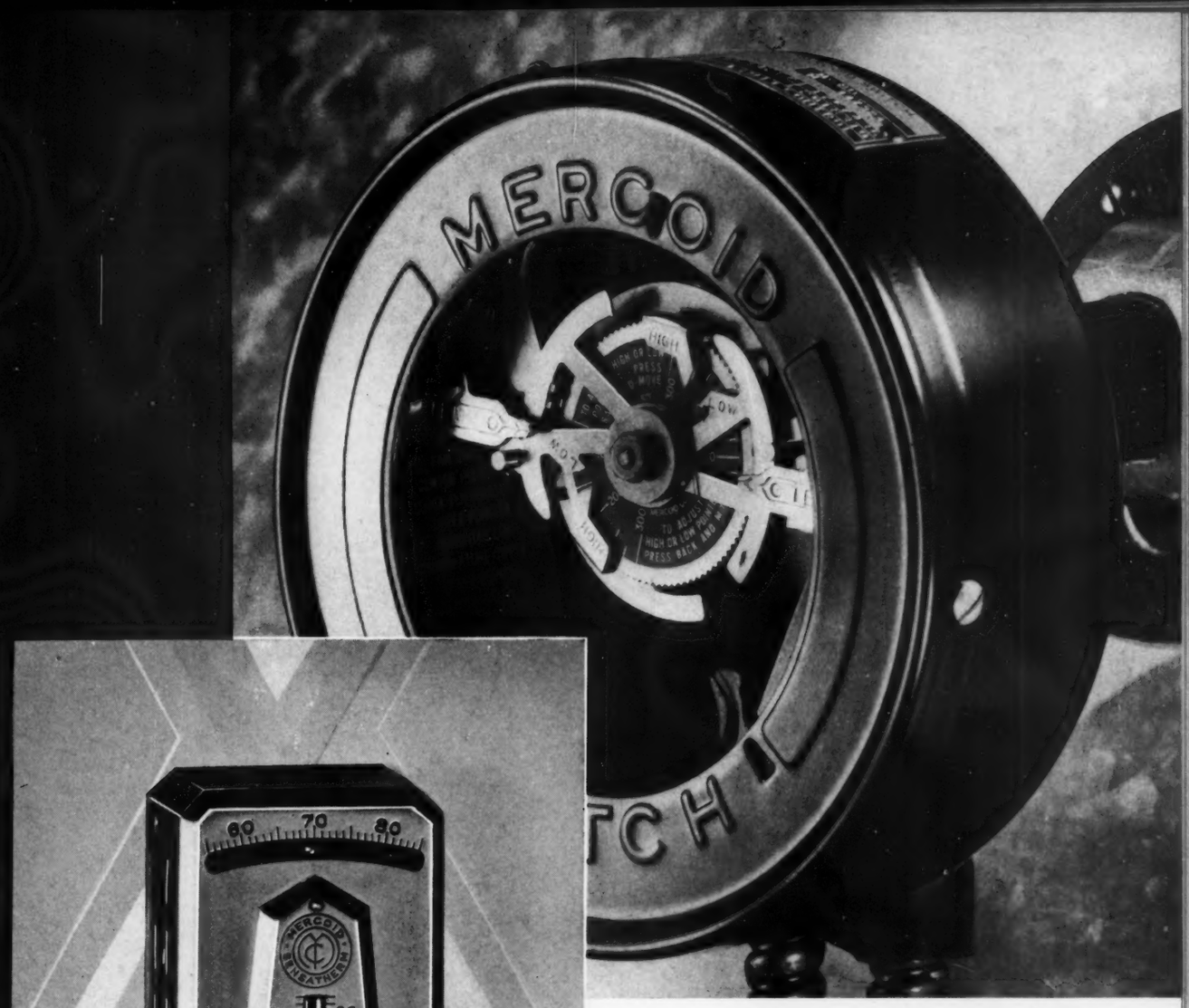

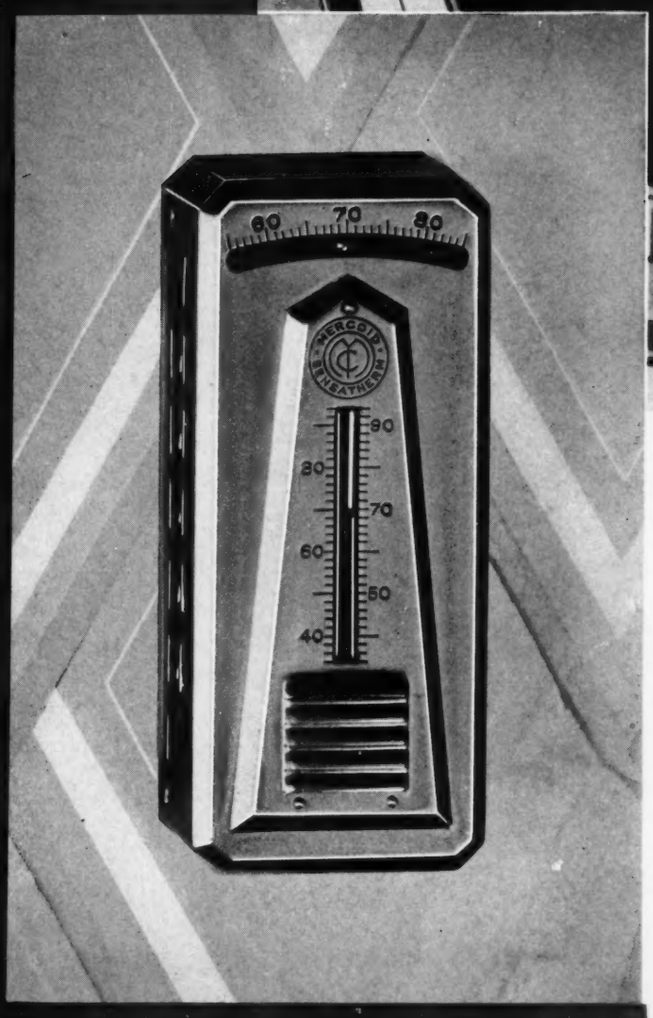

A WISE SELECTION

The market for automatic heat has just been scratched. The potential business ahead is tremendous.

The secret of augmenting sales, rests largely in the type of controls used in governing the automatic heating equipment. Nothing has a greater tendency to retard sales than trouble. It has a "grapevine" of its own that spreads with telling effect, and anything that eliminates trouble is cheap at any price.

Mercoid Controls help to instill confidence wherever they are installed—there is a reaction of complete satisfaction. This is a proven fact, backed by evidence from all sections of the country.

Illustrations herewith show two popular instruments, which are well known to the trade. The combination Fan and Limit Control has an enviable record for its unfailing performance. The same thing may be said for Mercoid Sensatherm—the thermostat of beauty and mechanical perfection. Ask the man who knows.

If there be one who has not as yet used a Mercoid Control; there is a treat in store. Use Mercoid Controls on the next job and note the difference.

All Mercoid Controls are equipped exclusively with hermetically sealed mercury contact switches—the switch that never fails, because it cannot be affected by dust, dirt or corrosion.

See catalog for detailed information on the complete line. A copy will be sent upon request.

THE MERCOID CORPORATION
4207 BELMONT AVENUE • CHICAGO, ILLINOIS

LET'S TALK FACTS

...YOU NEED *Hydraulic Action* TO INSURE POSITIVE TEMPERATURE CONTROL FOR YOUR EQUIPMENT...

WHAT IS *Hydraulic Action?*

It is the expansion and contraction due to temperature change, of a "solid liquid" charge against a single stainless steel diaphragm in a completely sealed system. This liquid charge does not vaporize but remains in a liquid state throughout the entire control range. The sensitive element consists of a copper bulb filled with this special liquid from which all traces of air and gas have been removed, and connected to the diaphragm for direct and positive transmission of movement to the switch. An expansion force is obtained that is comparable to that of a solid metal bar.

TYPE 513

Single Speed Fan Control
— Range 100° to 300° F.
Other ranges also available.

Type 513
(with cover removed)

WHAT *Hydraulic-Action* MEANS TO YOU

The powerful, uniform expansion and contraction of a solid liquid charge against a stainless steel diaphragm, combined with the mechanical simplicity of White-Rodgers Hydraulic Action Controls assures you:

EASE OF SETTING
RAPID RESPONSE
ACCURACY OF PERFORMANCE
SIMPLICITY OF MOUNTING
HIGH ELECTRICAL RATING
TROUBLE-FREE SWITCH OPERATION
IMPROVED APPEARANCE

It will pay you to investigate all the outstanding advantages of the complete line of White-Rodgers Controls! Write today for the new White-Rodgers Condensed Catalog.

HYDRAULIC ACTION CONTROL

WHAT ARE THE ADVANTAGES OF *Hydraulic Action?*

1. Equal diaphragm movement for each degree of temperature change makes possible:
   a. Uniformly calibrated dials.
   b. Equal Power at any point within range.
   c. Positive Accuracy throughout the entire range.
2. Control can be mounted in an off-level position without affecting its calibration. This saves installation time.
3. Sturdy switch construction with high current rating because of the high power available.
4. Compactness—two or three independently adjustable switches may be mounted in a single housing, resulting in a saving in installation cost.
5. Hydraulic Action Controls may be used on line or low voltage.

TYPE 519

Combination Fan and Safety Limit Control — Range 100° to 300° F.
Other ranges available.

Type 519

WHITE-RODGERS ELECTRIC COMPANY

• *Controls for Refrigeration* • *Heating* • *Air Conditioning* •

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